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BALLARIN (C.). **Untersuchungen über Helminthosporium papaveris.** [Studies on *Helminthosporium papaveris.*]—*Phytopath. Z.*, 16, 4, pp. 400–442, 18 figs., 7 graphs, 1950.

A comprehensive, fully tabulated account is given of the author's studies at the Technical College, Brunswick, Germany, on opium poppy leaf blight (*Pleospora calvescens*) [or *P. papaveracea*: *R.A.M.*, 31, p. 85]. The author considers it impracticable to decide with certainty whether the conidial state is a *Dendryphion* or a *Helminthosporium* owing to the variable diagnostic characters and difficulties in the classification of the two genera, but the weight of evidence is in favour of retaining the name *H. papaveris*. The fungus appears to be strictly specialized on species of *Papaver* (including *P. cardinale*) [cf. loc. cit.], two nearly related *Eschscholtzia* spp. having remained free from infection in inoculation experiments. Tests were further carried out on a number of crucifers with usually negative results, though on some of the seedlings isolated brown spots gave rise to weak conidiophores of the *Helminthosporium*. A similar relationship was observed in tests on Chenopodiaceae (beet and spinach) [loc. cit.]. On both crucifers and chenopods, however, the habit of the fungus was definitely saprophytic.

The number of septa in the conidia varies to some extent with habitat and nutritional conditions. The form of the conidiophores also is largely determined by nutritional conditions. For instance, on infected poppy capsules the branching of the superficial hyphae is more profuse than on agar. Oidia, chlamydospores, and stromata are formed in pure culture. The maximum yield of mycelium is obtained at pH 5, the lower and upper limits lying at 3 and over 10, respectively. The incidence of seedling infection was higher in acid than in alkaline seed-bed soils. Poppy oil was assimilated in low concentrations, but cellulose could not be utilized under the experimental conditions.

Mixed crops of poppies and beans [*Phaseolus vulgaris*] yielded a smaller harvest of sound seeds (43·3 per cent. per 40 sq. m.) than mixed poppies and sugar beet (47·4) or pure stands (60·7). Late sowing also contributed to an increase in infection [cf. ibid., 29, p. 434], the percentages of healthy capsules per 40 sq. m. from plots sown on 21st April and 5th and 19th May being 43·5, 39·7, and 37·1, respectively.

PILÁT (A.). **Klíč kurčování našich hub hřibovitých a bedlovitých. (Agaricalium europaeorum clavis dichotomica.)** [European Agaricales with dichotomous keys.]—719 pp., 661 figs., Brázda, Praha, 1951. 832 Kčs. bound, 758 unbound.

This important book in the Czech language is the first comprehensive flora of European agarics since Hymenomycetes europaei by Fries in 1874 and the only work to date in which the genera and species are all keyed out. Bibliographies are provided to the more important books and papers on the various genera and other

groups of agarics. About 2,250 species of agarics and boleti are included, many of which are illustrated in the 661 excellent black and white reproductions of photographs. The author's taxonomy is conservative and similar to that of Konrad and Maublanc.

DEIGHTON (F. C.). **New African Meliolaceae.**—*Sydowia*, 5, 1–2, pp. 1–8, 1951.

The author describes eight new species and two new varieties of Meliolaceae from Africa [cf. *R.A.M.*, 29, pp. 56, 144; 31, p. 33].

SUBRAMANIAN (C. V.). **Is there a 'wild type' in the genus Fusarium?**—*Proc. nat. Inst. Sci. India*, 17, 6, pp. 403–411, 1 pl., 1951.

An investigation was made at the University Botany Laboratory, Madras, to elucidate the question of 'wild type' in the genus *Fusarium* as suggested by Miller [*R.A.M.*, 26, p. 218], using 87 pathogenic isolates from six hosts and 20 from Udamalpet black cotton soil infested with wilt [*F. vasinfectum*] secured by the root-burial technique (*J. Indian bot. Soc.*, *1946*, pp. 209–213, 1946) so that predominantly saprophytic forms might be included. All were studied immediately after isolation on potato dextrose agar.

The type of growth varied widely among the different isolates. Of the 87 from plant hosts, 27 developed typical adpressed growth with no aerial mycelium; eight produced no conidia, nine no microconidia, and 21 no macroconidia. The macroconidia usually had a minimum of three septa. Sporodochia or pionnotes were observed in 35 isolates and chlamydospores in 71. The 16 which fell into the *Elegans* group [loc. cit.] comprised 15 from wilted cluster bean (*Cyamopsis tetragonoloba*) and one from brinjal [eggplant]. Those in the section *Martiella* [ibid., 21, p. 223] originated as follows: two from horsegram (*Dolichos biflorus*), three each from green gram (*Phaseolus radiatus*) [*P. aureus*] and *C. tetragonoloba*, nine from pineapple, and 12 from eggplant. *Gibbosum* was represented by two isolates, *Arthrosporiella* by two, and (?) *Lateritium* by nine.

Of the 20 soil isolates only one did not produce conidia, 12 belonged to *Martiella*, five to *Elegans*, and two to *Gibbosum*. The majority had tri-septate conidia.

It is suggested that species of *Fusarium* occur in nature in numerous forms in the nature of a clone, as suggested by Snyder *et al.* [ibid., 28, p. 603] and not as a single 'wild type'. Since sporodochia were produced by several isolates immediately after isolation, they are considered a natural characteristic of the genus and should be of value in taxonomic studies.

LEONARD (W. H.) & ROBERTS (R.). **Tea in Japan.**—*Rep. nat. Resources Sect., G.H.Q. Supreme Commander Allied Powers, Tokyo*, 125, 54 pp., 1 pl., 21 figs., 1 graph, 1 map, 1 chart, 1949. [Multilithed. Received March, 1952.]

The most prevalent diseases of tea in Japan are brown blight (*Guignardia camelliae*) [*R.A.M.*, 21, p. 166], anthracnose (*Gloeosporium theae-sinensis*) [ibid., 3, p. 4], blister blights (*Exobasidium vexans* [C.M.I. map No. 45] and *E. reticulatum* [*R.A.M.*, 3, p. 4]), and leaf spot (*Phyllosticta theifolia*). The important tea diseases are controlled in Japan by applications of 4–4–80 Bordeaux mixture, usually made at the rate of 935·3 l. per ha., or by proprietary materials known as 'copper compounds 1, 2, and 3'. For general disease control single applications are made in late April, early May, after each picking, and in late September. Four to seven applications may be necessary. Japanese farmers rely much on fertilizers for disease control. Experimental evidence demonstrated that repeated or heavy applications of Bordeaux mixture are detrimental to leaf quality [cf. ibid., 30, p. 587].

Stover (R. H.). **Black rootrot of Tobacco in Ontario and factors relating to its control.**—*Plant Dis. Reptr*, 34, 12, pp. 387–391, 1 fig., 1 graph, 1950. [Multilithed.]

Experiments on the control of black root rot (*Thielaviopsis basicola*) of tobacco [*R.A.M.*, 30, p. 631] were carried out in the Laboratory of Plant Pathology, Harrow, Ontario, at temperatures of 68° F. using the varieties Green Briar (susceptible) and Harrow Velvet (resistant) [ibid., 30, p. 508] in pots of naturally infested soil (pH 6·6) in which tobacco had been grown for eight consecutive years, and to which fumigants had been added. Dowfume N [cf. above, p. 248], 3 ml. in the centre of each 4-in. pot, was highly effective in controlling the disease and encouraged increased growth not only of the susceptible variety but also of Harrow Velvet. It was planned to continue these experiments in 1951.

Tirelli (M.). **Contributo alla conoscenza delle enazioni del Tabacco.** [Contribution to the knowledge of Tobacco enations.]—*Tabacco*, 55, 623, pp. 179–210, 22 figs., 1951.

After reviewing in detail the literature dealing with enations on tobacco [cf. *R.A.M.*, 19, p. 308] and other plants, the author describes the detailed morphology and histology of those observed by him in 1949 on the lower surface of three yellowish-green, partly withered leaves of Virginia Bright tobacco. The leaves bearing the enations were of normal size and appeared to be perfectly healthy. No X bodies [cf. ibid., 4, p. 47; 9, p. 539; 11, p. 532; 16, p. 282; 31, p. 169] were present in the enations or the leaf blades. The author puts forward the tentative hypothesis that in some tobacco varieties there may be groups of embryonic cells which under the influence of certain external or internal factors may give rise to enations. Further investigations are in progress.

Johnson (J. C.). **Phoma rot of Tomatoes.**—*Qd agric. J.*, 73, 6, pp. 339–341, 3 figs., 1951.

Phoma rot of tomatoes (*P. destructiva*) [cf. *R.A.M.*, 30, pp. 453, 507], first recorded in Queensland in 1926 [cf. ibid., 10, p. 414], may become a serious problem locally in very wet seasons, when it may be the chief cause of fruit wastage in field and transit. Crop residues should be destroyed, seed-beds should not be near packing sheds or places where diseased and discarded fruits have been placed, and dead leaves should be removed. Applications of copper dusts or sprays should be made regularly in seed-bed and field [cf. ibid., 17, p. 139]. Injury during harvesting and packing should be avoided and fruit kept in dry conditions after picking until marketed.

Stoner (W. N.) & Hogan (W. D.). **A report of graywall or internal browning of Tomato in South Florida.**—*Plant Dis. Reptr*, 34, 12, pp. 379–380, 1950. [Multilithed.]

Although field observations failed to disclose any correlation of tomato greywall or internal browning [*R.A.M.*, 29, p. 64] in South Florida with climatic factors, in view of the complete failure to transmit the disorder mechanically it seems reasonable to assume that the condition is caused by physiological factors.

Schaible (L.), Cannon (O. S.), & Waddoups (V.). **Inheritance of resistance to Verticillium wilt in a Tomato cross.**—*Phytopathology*, 41, 11, pp. 986–990, 1 fig., 1951.

The material used in recent studies at the Utah Agricultural Experiment Station on the mode of inheritance of resistance to *Verticillium albo-atrum* in the tomato [*R.A.M.*, 30, p. 635] comprised 322 F_1 hybrids of a cross between the wilt-resistant

W6 and the susceptible Moscow variety, 656 F_2 plants from these, and 42 F_3 families. Resistance to *V. albo-atrum* in W6 appears to differ from that in Moscow by a single dominant Mendelian factor, *Ve Ve*, in the former variety.

PORTE (W. S.) & WALKER (H. B.). **Two members of the Beltsville Station relate the interesting facts about Sunray, a new golden wilt resistant Tomato.**—*Seed World*, 66, 4, pp. 10, 12, 2 figs., 1950. [Received March, 1952.]

A new tomato variety developed at the Plant Industry Station, Beltsville, Maryland, from a cross between Pan America and Jubilee is stated to possess the high resistance of Pan America to *Fusarium* wilt [*F. bulbigenum* var. *lycopersici*: cf. *R.A.M.*, 29, p. 540; 30, pp. 453, 549, 635].

Report of the Fifth Session of the International Poplar Commission and Proceedings of the Fourth International Poplar Congress.—68 pp., Rome, Food and Agriculture Organisation, 1951. [Mimeographed.]

Information on artificial hybrids and diseases of poplar trees in the United States given in an article by R. ROL in part I (pp. 17–25) of this report has already been noticed from another source [*R.A.M.*, 31, p. 38]. In addition to the diseases already mentioned, the following were also found attacking poplars in the United States: *Septoria musiva* [ibid., 25, p. 426] on leaves of *Populus monilifera*, apparently the most dangerous parasite of poplars in the country; *Nectria* sp. [ibid., 23, p. 47; 30, p. 636]; *Napicladium* [*Fusicladium*] sp.; and *Fomes igniarius* [ibid., 30, p. 637] causing a heavy damage to natural stands of aspen [*P. tremuloides* and *P. grandidentata*: ibid., 31, p. 38].

Attention is drawn to the danger of importing into Europe cuttings of artificial hybrid poplars and thus running the risk of introducing serious and as yet unknown parasitic diseases or of the trees concerned contracting bacterial canker [*Pseudomonas syringae* f. sp. *populea* and *P. rimaefaciens*: ibid., 30, p. 293]. From the European standpoint this is a very important question and appropriate measures should be taken.

On pp. 37 to 49 R. ROL and H. VAN VLOTEN review briefly the information gathered during the field research days of the Fourth International Poplar Congress in England. The pathogenic character of *P. syringae* f. sp. *populea* [ibid., 23, p. 430] and its symptoms in connection with bacterial canker [ibid., 30, p. 591] are described. High relative humidity and water table favour the establishment and the development of the disease. Of the fungi associated with normal cankers, *Cytospora* sp., three species of *Nectria* [ibid., 29, p. 129], and two species of *Fusarium*, tested separately in pure culture inoculation experiments, were incapable of causing canker, while *Dothichiza populea* [ibid., 30, p. 636] had only a slight pathogenic effect in three out of 200 inoculations.

The advantages and disadvantages of testing for resistance to poplar canker and other similar diseases caused by wound-parasites by natural infection in test plantations and by artificial inoculations in test plantations combined with laboratory tests are discussed.

The following measures are recommended to control the spread of bacterial canker between countries: surface sterilization of cuttings before dispatch and upon receipt of the material, cutting ½ cm. from each end and burning these parts to avoid the transmission of any contamination, growing the introduced cuttings under special observation for a year or two, and moving all test plantations to isolated nurseries. Introduction of poplars into Great Britain is allowed if a special licence is fastened to the outside of the parcel before dispatching or by the usual methods which require a certificate issued in the exporting country.

An account of the work done by the working party specially chosen to study

D. populea [ibid., 30, pp. 293, 507] and the methods for its control in Holland (pp. 63–64) is given by Dr. Houtzagers. In spraying experiments in 1950 and 1951 two-year-old nursery trees of the very susceptible *P. deltoides* var. *missouriensis* were treated at monthly intervals with 1 to 1½ per cent. Bordeaux mixture and 0·1 to 0·2 of 1 per cent. aaventa (organic mercury) [ibid., 30, p. 631], receiving not more than three sprays per month per plot. The latter was on the whole more effective. Control was better in 1951 when the first spray was applied in mid-May instead of mid-August as in 1950. A second series, including spraying of fertilizers containing various quantities of phosphate, potassium, and nitrogen, indicated that the first two may benefit the plants by rendering the young trunks more resistant, but the last might be detrimental in causing too rapid a growth.

D. populea was found to be more severe and dangerous in sandy nurseries or plantations than in clayey ones, where damage was negligible. Cuttings are always soaked in Bordeaux mixture before delivery to nurserymen by the Netherlands Health Exploitation Company.

Busnel (R.-G.), Darpoux (H.), & Ridé (M.). **Utilisation de la chaleur transmise par le rayonnement infrarouge comme méthode de désinfection des Châtaignes contre les spores d'Endothia parasitica (Murrill) Anderson.** [The use of heat transmitted by infra-red radiation as a means of disinfecting Chestnuts against the spores of *Endothia parasitica* (Murrill) Anderson.]—*C. R. Acad. Agric. Fr.*, 37, 13, pp. 513–515, 1951.

In these experiments 250–W. infra-red tungsten filament lamps having a maximum wave-length of 12,000 Å were used to disinfect chestnut fruits against the spores of *Endothia parasitica* [*R.A.M.*, 30, p. 349]. Thermocouples placed among the nuts controlled the temperature. The calibrated fruit in a single layer on a wide-meshed tray running on rails passed between the lamps in an oven 70 by 50 by 80 cm., and then into a drier twice as long as the oven and maintained at 60° C. Passage through the oven took 48 to 102 seconds, according to the size of the fruit, distance between the lamps, and density of the lamps to the sq. m.

Whole nuts (120 to 130 per kg.), wounded nuts, and excised styles were soaked in a spore suspension, dried at laboratory temperature for 48 hours, and passed through the oven at different rates. Sterile glass slides sown with the same suspension were similarly treated. After disinfection the condition of the chestnuts was examined and spore control assessed by washing in sterile water and sowing the washings on potato dextrose agar.

The spores were destroyed completely after passage through the oven lasting 70 and 80 seconds, with the lamps at a distance of 7·5 cm. and at 200 volts. The nuts suffered no deleterious effect either at these periods or at 90 seconds. The low cost of this method of disinfection is satisfactory from an industrial and economic as well as from a pathological aspect. The insects *Asperesia* and *Balaninus* were killed inside the fruit as well as the fungus spores.

Harvey (J. M.). **Bacterial leaf spot of Umbellularia californica.**—*Madroño, Calif.*, 11, 5, pp. 195–198, 1 fig., 1952.

Umbellularia californica trees near Berkeley, California, developed black angular spots on the leaves, delimited to some extent by the small veinlets. In old infections the centre died and the part surrounding the periphery frequently yellowed. Necrotic spots often contained swollen portions which when pricked yielded a white bacterial ooze. The disease was often found in nature on leaves scratched as a result of wind movement.

Inoculations of punctured, scratched, and unwounded leaves of potted *U. californica* seedlings by spraying with a suspension of the bacterium obtained from affected *U. californica* leaves resulted in the appearance of black spots on the

punctured and scratched leaves seven days after inoculation. Immature and unwounded leaves seldom developed any spots. The bacterium was re-isolated from the lesions and further inoculations with the re-isolate gave typical symptoms. Inoculations of avocado also caused infections. The organism is named *Pseudomonas lauracearum* n. sp.

WELLMAN (F. L.) & GRANT (T. J.). **An apparent virus disease of Casuarina in the American tropics.**—*Plant Dis. Reptr*, 35, 11, pp. 498–499, 1951. [Multilithed.]

Brooming symptoms, characteristic of virus infection, were observed for the first time in 1947 on *Casuarina equisetifolia* in the neighbourhood of San José, as far east as Paraiso, and in the regions of San Ignacio, Costa Rica, as well as in Mexico and the Panama Canal Zone. The disease, which causes mottling and stunting of the foliage, multiple branching, and death of all or part of the tree, appears to be increasing in severity and may become a serious limiting factor in growing *Casuarina*.

RISHBETH (J.). **Butt rot by Fomes annosus Fr. in East Anglian conifer plantations and its relation to tree killing.**—*Forestry*, 24, 2, pp. 114–120, 3 diags., 1951.

Further studies on *Fomes annosus* attacking conifers in East Anglia [cf. *R.A.M.*, 30, p. 591] showed that whereas in pine all tissues tend to develop resistance when the trees are about 25 years old, in *Pseudotsuga taxifolia*, larch, and spruce, only the outer tissues become resistant [cf. ibid., 17, p. 714]. In large roots of spruce the fungus grows much more rapidly in the inner wood than in the outer wood and bark, from the unaffected parts of which small branch roots may be formed. On entering the butt the parasite may ascend several m. in the heartwood, secondary fungi often being present in advanced stages.

The relation of butt rot to thinning, soil conditions, and the past history of the site is discussed.

HENDERSON (F. Y.). **Report of the Director of Forest Products Research for the year 1949.**—*Rep. For. Prod. Res. Bd, Lond., 1949*, pp. 4–45, 8 pl., 1 fig., 1951.

In this report [cf. *R.A.M.*, 30, p. 397] it is stated that Dr. Lohwag has prepared a series of photomicrographs illustrating the effect of various wood-rotting fungi on the cell walls of different timbers and demonstrated that the tangential walls may be destroyed by certain fungi before the radial walls of the same cells are reduced in thickness.

It was found that the addition of cuprous oxide to a magnesium oxychloride cement [ibid., 29, p. 594] rendered it sufficiently toxic to prevent any outgrowth of *Merulius lacrymans* [ibid., 30, p. 623; 31, pp. 41, 154] from wood blocks heavily infected with the fungus. The appearance of dry rot in houses built in the last four years has demonstrated the need for treating wood with a preservative before laying it directly on solid floors. It is also recommended that no impervious covering should be laid on a new solid floor until six to twelve months after construction.

Observations during the past two years indicate that fungi may contribute to the breakdown of the timber in water-cooling towers, hitherto assumed to be due solely to hydrolysis by heated water. The various organisms isolated include *Chaetomium globosum*, *Orbicula spadicea*, and *Phialophora* spp. *Coniophora cerebella* [*C. puteana*: loc. cit.] was the fungus most commonly isolated from decayed woodwork in ships and boats, *Poria* spp. also being observed on several occasions. The decay was generally associated with leakages of fresh water.

The application of a suitable combined insecticide and fungicide to logs of many light-coloured softer hardwoods immediately after felling appears to afford considerable protection against damage by [unspecified] staining fungi and borers.

In a preliminary experiment to determine the effect of the size and shape of test blocks on the amount of fungal decay, with the object of standardizing laboratory

tests, beech blocks exposed to *Polystictus versicolor* [ibid., 30, p. 353] for eight weeks at 22° C. lost weight as follows: 10 by 2·5 by 1·25 cm. 21·1 per cent., 5 by 2·5 by 1·25 cm. 31·5 per cent., and 5 by 2·5 by 0·5 cm. 49·1 per cent.

ROOSEN (P.). **Les tests d'appréciation de la durabilité naturelle ou artificielle du bois.** [Tests for estimating the natural or artificial durability of wood.]—*Bull. Soc. for. Belg.*, 58, 10, pp. 393–415, 2 pl., 1951.

After discussing the various external and internal factors affecting the resistance of timber to attack by wood-destroying fungi [cf. *R.A.M.*, 30, p. 254], the author describes the method of determining such resistance by estimating the toxicity of the chemical compounds extracted from the wood towards selected fungi (a method he considers to give unreliable results), and the direct testing of wood blocks by fungi and calculating the loss of dry weight due to infection [cf. ibid., 13, p. 485]. He next describes the method of comparing the fungicidal efficiency of wood preservatives (the artificial durability of wood) by testing them against fungi in culture and gives a full account of the wood-block impregnation method [ibid., 27, p. 52, and next abstract].

BAVENDAMM (W.). **Die Beurteilung der toxischen Wirkung der Holzschutzmittel.** [The assessment of the toxic action of timber preservatives.]—*Holz Roh- u. Werkstoff*, 9, 3, pp. 101–105, 1 graph, 1951.

Accepting with certain reservations the method of Schulze *et al.* (*Wiss. Abt. dtsch. MaterPrüfAnst.*, 2, 7, pp. 1–40, 1950), previously outlined by Theden [*R.A.M.*, 28, p. 595], for the laboratory evaluation of timber preservatives, the author carried out a further series of experiments [cf. ibid., 28, p. 96] on 64 chemical compounds. From the resultant data it now appears that *Lenzites abietina* and *Coniophora cerebella* [*C. puteana*] should rank with *Polyporus vaporarius* [*Poria vaporaria*: ibid., 30, p. 296] as the least vulnerable to fungicidal wood protectants.

STORCH (K.). **Die Holzschutzmittel.** [Timber preservatives.]—*Holz Roh- u. Werkstoff*, 9, 4, pp. 168–171, 1951.

This survey of the various categories of timber preservatives available in the Federal German Republic comprises indications as to their uses, the names and addresses of the manufacturers, and other useful information.

SANDERMANN (W.), SCHÄRFE (E.), & FROEDE (O.). **Über die Eindringtiefe des Sublimats bei einfacher und verbesserter Kyanisierung.** [On the depth of penetration of sublimate in simple and improved kyanization.]—*Holz Roh- u. Werkstoff*, 9, 5, pp. 186–190, 1 fig., 2 diags., 2 graphs, 1951.

Following a survey of different methods of kyanization [*R.A.M.*, 31, p. 157], the authors summarize and briefly discuss Winnig's report on the practical experience of the German Postal Service with this mode of timber preservation [ibid., 19, p. 57]. By means of a new colorimetric technique (to be described fully elsewhere), involving a modification of that described by Johansson (*Svensk PappTidn.*, 53, p. 231, 1950), the actual depth of penetration of mercuric chloride into spruce wood was ascertained to exceed by some 15 mm. the level indicated by the ammonium sulphide procedure. The bulk of the chemical is fixed in the fibre during the first few hours of impregnation, and therefore no further accumulation during the storage period is to be anticipated. The use of a mixture of 0·66 per cent. mercuric chloride and 6·6 per cent. sodium chloride ('mixed kyanization') increased the depth of penetration in the tank process four- to fivefold. After steaming at 100° or 120° C., followed by 10 days in a cold solution of 0·66 per cent. mercuric chloride, the impregnation of a sample of spruce wood 12 cm. in diameter was found to be virtually complete.

JACKS (H.). **The efficiency of chemical treatments of vegetable seeds against seed-borne and soil-borne organisms.**—*Ann. appl. Biol.*, 38, 1, pp. 135–168, 15 graphs, 1951.

Experiments were carried out in the Department of Plant Pathology, Imperial College of Science and Technology, London, to study the effect of several newly introduced seed-protectants on vegetable seeds [*R.A.M.*, 30, pp. 7, 143; 31, p. 51] under a wide range of conditions. The seeds selected, viz., Imperial lettuce, Laxton Superb pea, Canadian Wonder French bean [*Phaseolus vulgaris*], Early Snowball turnip, Dewar's Improved red garden beet, Early Market tomato, and Giant White celery, all gave satisfactory germination from the commercial aspect, although sclerotia were present in all and mycelium in all except beet, 6 per cent. of the peas being contaminated with *Ascochyta* [*pisi*], 13 per cent. of the celery with *Septoria* [*apii* and *S. apii-graveolentis*], and 57 per cent. of the beet with *Phoma* [*betae*].

In preliminary trials of 34 fungicides some, such as spergon, gave unpromising results in two laboratory tests, but proved most useful in the soil. The Ulster method [ibid., 20, p. 261; 31, p. 118] was the most satisfactory of the laboratory methods, although misleading in that it showed all the copper compounds, including some valuable protectants, to be non-fungistatic and certain thiram preparations to be equally efficient, whereas in soil tests they differed considerably. The final selection of materials for further study was made, therefore, from greenhouse and field tests, the latter at the Imperial College Biological Field Station, Slough. Those chosen were cuprocide, spergon, panogen, thiram, ferbam, Dow 9B, and 36L (1-*p*-sulphamylphenyol-3: 5-dimethyl-4-nitrosopyrazole obtained from the Naugatuck Chemical Co. Ltd., U.S.A.). For some which showed poor adherence the seed was pre-treated with a wetter. Dispersible materials, less adherent than non-dispersible, required longer mixing to ensure even coating of seed, higher dosages of the former being applied by the short wet method [ibid., 24, p. 95]. In the greenhouse the seeds were sown in sterilized soil in tins, and examined 15 to 30 days after emergence. The treatments, though not protecting against post-emergence damage, appeared to confer increased vigour, thus enabling a greater number to survive post-emergence attack. Panogen was extremely phytocidal to lettuce at 2 per cent. (of seed weight) while cuprocide, spergon, and thiram gave significantly lower emergence at 2 than at 1 per cent. Lettuce, pea, and bean responded well to treatment but turnip hardly at all. Emergence of beet was increased by panogen and thiram, tomato did not respond to cuprocide, and celery responded only to cuprocide and ferbam. For each treatment the lowest dosage which gave a significant increase in emergence over the control, while not significantly less effective than the optimum, was selected for further trial.

In greenhouse tests with all seven varieties at 25, 45, and 65 per cent. water-holding capacity and temperatures of 5° to 12° C. and 16° to 20°, tomato and celery being tested at the higher temperature only, whereas total emergence was only slightly affected by treatments, proportions of healthy to diseased seedlings were increased, counteracting the opposite effect of high soil moisture. In dry soil cuprocide and panogen reduced lettuce emergence; cuprocide and Dow 9B retarded that of peas and were toxic to turnip seed; spergon was toxic to beet and failed to protect tomato. Only 36L increased celery emergence, while thiram gave consistent results for all seeds. All treatments increased the speed of emergence of lettuce, some only slightly. In general, the lower temperature reduced percentage emergence, relatively more for untreated than for treated seed, thereby affording a more stringent test of the efficiency of each product.

In the field 17 monthly sowings of pea and lettuce were made from December, 1947, to March, 1949, and seven of French bean and beet and six of turnip between spring and autumn, 1948. All treatments were effective with lettuce, pea, and French bean; beet responded to all except spergon. Thiram, spergon, and 36L

were the most effective. Cuprocide was phytocidal to bean at low temperatures. The response of lettuce was at a minimum from July to September when temperature was high and soil moisture low and most pronounced during the winter months. Pea showed a consistently high rate of emergence after treatment compared with the variable behaviour of untreated lots.

In greenhouse tests addition of water over the range 45 to 65 per cent. water-holding capacity depressed emergence of untreated lettuce and pea seed in unsterilized soil, while seed treatment reduced this effect. Over the same moisture range in autoclaved soil inoculated with equal proportions of *Pythium ultimum*, *Rhizoctonia* [*Corticium*] *solani*, and *Fusarium solani* untreated pea seed gave very low emergence, and the use of protectants, though very beneficial, did not balance the effect of early watering. In two similar field experiments treatments again uniformly improved emergence. Isolations from diseased seedlings showed that watering immediately after sowing caused a considerable increase in the percentage of the main pathogens, especially *Fusarium* sp.

The following isolations were made from seeds germinated on filter paper: lettuce 18·5 [? per cent.] *Fusarium* and 13·5 *Corticium*, pea 15·8 *Fusarium*, bean 40 *Fusarium*, turnip 11 *Phoma*, beet 14 *Fusarium* and 38 *Phoma*, tomato 11·6 *Fusarium* and 14·2 *Alternaria*, and celery 10 *Fusarium*. From similar seed germinating on malt agar the same range of fungi was obtained but some (e.g. *Fusarium*) in very different percentages, the incidence of *Penicillium* rising from 22 to 95 per cent. in various seed lots. The main trend in isolations made 20 days after sowing and again at the time of lifting from monthly field sowings of pea and lettuce was the relative frequency of *Fusarium* and infrequency of *Pythium* at higher temperatures and during the summer period. It would be unsafe, however, to assume that these trends give a correct measure of the seasonal activity of *Pythium*, as the frequency of isolations depended on the interval from sowing.

From the point of view of seed disinfection panogen and spergon at standard doses were the most efficient of the fungicides and as effective in treating lettuce seed as the best laboratory method (soaking in acidulated mercury chloride). None of the treatments prevented the growth of *A. pisi* on pea seed but all except cuprocide increased emergence of *Ascochyta*-spotted seed sown in autoclaved soil, and reduced *Fusarium* [ibid., 17, p. 431]. Bacterial contamination of French bean, which may cause seed decay, was eliminated by spergon and panogen. *Alternaria* infection of turnip was reduced by spergon, panogen, and thiram. All the substances tested on beet compared favourably with laboratory methods in reducing the incidence of *Phoma betae* [ibid., 27, p. 550]. Although pycnidia were present there was no growth of *Septoria* on celery since the seed was over two years old.

In soil inoculated with *Pythium ultimum*, *C. solani*, and *F. solani* var. *martii*, treatments were more beneficial to the more susceptible pea seed than to lettuce. Thiram, 36L, and, to a lesser extent, spergon appeared to be the most effective. Mixing of inocula did not increase the harmful effect upon emergence; often one organism impeded the activity of the other. Mixing the protectants gave no advantage over their separate use.

It was generally concluded that seed can be treated within twelve months before sowing without serious reduction in commercial value.

TISDALE (W. B.). **Clubroot of crucifers in Florida.**—*Plant Dis. Reptr*, 35, 11, p. 509, 1951. [Multilithed.]

Florida Broadleaf mustard and Shogoin turnip, planted during the summer of 1951 in a field in Marion County, Florida, were both found to be infected with club root (*Plasmodiophora brassicae*) [C.M.I. map No. 101; *R.A.M.*, 27, p. 464; 29, p. 498]. This is believed to be the first record of the disease in Florida.

JORRITSMA (J.). **Enkele actuele vraagstukken in de Suikerbietenteelt.** [Some topical problems in Sugar Beet cultivation.]—*Landbouwk. Tijdschr.* (*Wageningen*), 63, 9, pp. 594–602, 1951. [English summary.]

Practically all the sugar beet seed sown in Holland is treated with mercurials as a preventive against infection by black root [black leg: *Phoma betae*, *Pythium* spp., etc.; cf. *R.A.M.*, 29, p. 394], and other seed- and soil-borne fungi. This practice is of value in promoting rapid and regular development of the stand, but its efficiency is largely dependent on the physical status of the ground, various pathogens tending to predominate in soils where defective aeration is combined with excessive moisture and low temperature. An aspect of the treatment requiring investigation is its phytotoxicity. The results of experiments with a number of mercurial dusts showed that an increase in the dosage from the standard 8 gm. per kg. seed caused a reduction of germinative energy and, with high concentrations, of the rate of emergence, a retardation of which, unnoticed in the spring, may be reflected in lower yields in the autumn. It was observed that only about half the 8 gm. customarily applied actually adheres to the seed, the remainder lying loose in the sack. Thus, the 400 gm. in a sack of 50 kg. will be deposited here and there on the seed in concentrations far exceeding 8 gm. per kg.

ANDRUS (C. F.) & HOFFMAN (J. C.). **Fullgreen, a blight resistant bush Snap Bean.**—*Seed World*, 66, 9, pp. 16, 18, 1950. [Received March, 1952.]

The Fullgreen No. 1 bush snap bean [*Phaseolus vulgaris*] variety, developed at the U.S. Regional Vegetable Breeding Laboratory, Charleston, South Carolina, is stated to be relatively resistant to common blight (*Xanthomonas phaseoli*) [see above, p. 219], halo blight (*Pseudomonas medicaginis* var. [f. sp.] *phaseolicola* [loc. cit.], powdery mildew (*Erysiphe polygoni*) [see above, p. 218], bean virus 1 [bean mosaic virus: loc. cit.], and some forms of anthracnose [*Colletotrichum lindemuthianum*: *R.A.M.*, 30, pp. 502, 599] and rust [*Uromyces appendiculatus*: ibid., 30, p. 453]. It is, however, fully susceptible to *X. phaseoli* var. *fuscans* [ibid., 30, p. 502]. The degree of resistance to common and halo blights is similar to that displayed by the Idaho No. 1 Great Northern variety [cf. ibid., 28, pp. 26, 44].

THOMAS (H. R.). **Yellow dot, a virus disease of Bean.**—*Phytopathology*, 41, 11, pp. 967–974, 1 fig., 1951.

A virus causing primary necrosis of the veins, followed by a reddish discoloration of the petioles, nodes, and stems on most dry bean (*Phaseolus vulgaris*) varieties, accompanied on some by an extremely faint mottle and succeeded on all by the development of sparse, bright yellow dots, 1 to 2 mm. in diameter, was isolated in 1949 from a bean plant in Washington and in 1950 from lucerne in Idaho, both naturally infected. It is herein designated [bean] yellow dot virus (*Marmor medicaginis* var. *phaseoli* n. var. [a strain of bean mosaic virus]). In greenhouse experiments at the Plant Industry Station, Beltsville, Maryland, the virus proved to be transmissible by sap inoculation to 45 bean varieties, tobacco, *Nicotiana glutinosa*, *N. rustica*, *Datura stramonium* (very mild systemic symptoms only), *Gomphrena globosa*, Cubit cucumber, Tepary bean (*P. acutifolius*), Blackeye cowpea, Little Marvel pea (extremely mild leaf mosaic), Sunshine Tint *Zinnia* [*elegans*] (symptomless or slight vein clearing and mottling), *P. lunatus* (inconspicuous symptoms), *P. mungo*, *Melilotus alba*, clover, lucerne, soy-bean, *Crotalaria spectabilis*, lupin (*Lupinus albus*), and Broad Windsor broad bean. There was no evidence of seed transmission.

The yellow dot virus was inactivated by ten minutes' exposure to a temperature of 62° to 64° C. It withstood dilution up to 2,000 but not 3,000 times and ageing *in vitro* at 18° for 72 but not for 96 hours, and was recovered from desiccated bean leaves after a year's storage at 8°.

The inoculation of Topcrop bean plants with the yellow dot virus conferred protection against infection by the Ladino clover yellow patch [ibid., 29, p. 29] and alfalfa [lucerne] N (abs. in *Phytopathology*, 39, p. 861, 1949) viruses but not against primary and systemic invasion by tobacco ring spot, tobacco streak, and bean red node [see above, p. 219], or systemic infection by a necrotic strain of cucumber mosaic virus.

CHAMBERLAIN (D. W.). **Sclerotinia stem rot of Soybeans.**—*Plant Dis. Reptr*, 35, 11, pp. 490–491, 1951. [Multilithed.]

Stem rot of soy-bean due to *Sclerotinia sclerotiorum* [*R.A.M.*, 22, p. 463; 28, p. 154] caused considerable damage in a field in Illinois in 1950, this being the first occurrence there since 1946.

Under North Carolina growing conditions Roanoke, Ogden Soybeans excel.—*Seed World*, 66, 2, pp. 8–10, 3 figs., 1950. [Received March, 1952.]

According to E. E. Hartwig of the State Agricultural Experiment Station, Roanoke and Ogden [*R.A.M.*, 30, p. 259] continue to be the soy-bean varieties best adapted for seed production in North Carolina.

In trials by S. G. Lehman treatment of Roanoke seed with arasan [cf. above, p. 220] resulted in 97 per cent. germination compared with 75 per cent. for the untreated. In the field arasan (2 oz. per bush.) increased the number of plants which emerged and survived from 2 to 3·4 per ft. row when sown at the rate of four seeds per ft. row, from 3·7 to 6·3 at eight seeds, and from 5·2 to 9·9 at 12 seeds. Yield increased from 23·1 to 26·2 bush. per acre in the first plot and there was a net gain of 1·7 bush. per acre for the last.

In a further experiment by S. G. Lehman in 1947 replicated plots of Ralsoy, Ogden, and Roanoke were dusted with a mixture of 7 per cent. copper, 3 per cent. DDT, 10 per cent. wheat flour, and 80 per cent. Cherokee clay, six applications at rates of approximately 30, 60, and 90 lb. per acre being made at intervals of approximately ten days from 18th July. Control plots received the same dust without copper at 60 lb. Five weeks after the final application on 27th August the control plots had 27 per cent. of the leaf area affected by bacterial disease [? *Xanthomonas phaseoli* var. *sojense*, *Pseudomonas glycines*, and *P. tabacum*: cf. ibid., 30, pp. 258, 443], as against 15 per cent. or less in the treated plots. The mean yield of the three varieties in the control plots was 27 bush. per acre, the corresponding figures for the 30, 60, and 90 lb. applications of copper dust being 32·5, 32·5, and 32·7 bush. respectively.

[This article also appears in *Res. & Fmg, N.C.*]

TIFFANY (LOIS H.). **Delayed sporulation of Colletotrichum on Soybean.**—*Phytopathology*, 41, 11, pp. 975–985, 4 figs., 1951.

At the Iowa Agricultural Experiment Station the symptomless type of infection caused by seed-borne inoculum of *Colletotrichum truncatum* on soy-bean [*R.A.M.*, 30, p. 598] was investigated in 1948. The outer three or four rows of cells in the cortex adjoining the cotyledon were killed soon after the entry of mycelium from the latter, and their collapsed walls formed a corky area on the stem after the shrivelled cotyledons had fallen. The cortical cells subsequently invaded were not perceptibly affected by the intracellular establishment of the sparsely branched mycelium, which advanced most rapidly in a longitudinal direction. It grew very slowly during the period of rapid development of the host, remaining localized in the area of original entry from the cotyledon until a week or ten days before flowering, when it advanced distally in the cortical region. In several plants the course of the hyphae could be followed from the stem through the petioles and into the epidermal cells of the lower leaf blades. At this stage the mycelium had

progressed 2 to 3 cm. down the stem and here it remained stationary; no mycelium was found in the roots. At the beginning of pod development, mycelium was detected in the cells of the carpel wall, in the expanding locule, and in the cotyledons. No external symptoms of infection were observed at this stage, but at maturity some of the pods became covered with acervuli, while others appeared normal despite the presence of internal mycelium.

An important aspect of the ability of *C. truncatum* to penetrate certain cells of its host without appreciable disruption of their normal functions relates to the role of the latent mycelium in the survival of the pathogen from one season to another. Once entry to the seed is gained, the fungus is no longer dependent for survival on infection each succeeding year by conidia produced on overwintered diseased plant refuse.

KERNKAMP (M. F.) & GIBLER (J. W.). **Diseases of Soybeans new to Minnesota.**—*Plant Dis. Reptr*, 35, 11, pp. 509–510, 1951. [Multilithed.]

Soy-bean brown stem rot (*Cephalosporium gregatum*) [*R.A.M.*, 30, pp. 142, 312] and stem canker (*Diaporthe phaseolorum* var. *batatatis*) [loc. cit.] were reported for the first time in Minnesota in September, 1951, the former in the soy-bean disease nursery on the Minnesota Agricultural Experiment Station Farm, St. Paul, and in Freeborn county, and the latter in Waseca, Freeborn, Faribault, and Blue Earth counties.

GILPATRICK (J. D.) & BUSCH (L. V.). **Studies on the pathogenicity of different isolates of Ascochyta pisi Lib.**—*Plant Dis. Reptr*, 34, 12, pp. 383–387, 1950. [Multilithed.]

Studies in the Department of Botany, Ontario Agricultural College, Guelph, based on the pathogenicity of seven isolates of *Ascochyta pisi* [*R.A.M.*, 30, p. 425] from the major pea-growing areas of Canada, to eight pea varieties, *Vicia villosa* [ibid., 30, p. 232], and its var. *glabrescens* indicated that there are at least three physiologic races of the fungus. The Ottawa, Manitoba, and Alberta isolates from peas were only slightly pathogenic to *V. villosa* but the vetch isolates attacked both peas (Perfection and Thomas Laxton) and vetch. The Ottawa isolate attacked both leaves and stems of Perfection peas, while the Alberta and Manitoba isolates were confined chiefly to the leaves, and appear, therefore, to represent a third race. The pea varieties O.A.C. 181, Scotch, and A-100 possessed some resistance to *A. pisi* [ibid., 30, pp. 16, 400]. It is recommended that plant material should be tested against many isolates of *A. pisi* of differing pathogenicity when resistant varieties are being developed.

TIMS (E. C.). **Onion and Shallot downy mildew in Louisiana.**—*Plant Dis. Reptr*, 34, 12, pp. 380–382, 1950. [Multilithed.]

In experiments at Baton Rouge on the control of downy mildew of onions and shallots in Louisiana caused by *Peronospora destructor* [*R.A.M.*, 27, p. 176], a dust containing mineral oil and metallic copper in bentonite gave promising results on seed onions [ibid., 26, p. 436] in 1947; 7 per cent. copper plus 3 per cent. DDT plus 2 per cent. mineral oil in bentonite, and 8 per cent. dithane Z-78 plus 3 per cent. DDT in attaclay gave fairly good control in 1949. Two rows of shallots on which the disease was well established were dusted several times with a compound containing 6 per cent. metallic copper and 1½ per cent. mineral oil. The plants remained much greener and in better condition than the untreated ones.

The Calred onion variety, which is quite resistant to mildew in the seed stalk stage and moderately resistant to leaf infection, has been crossed with Creole at Beltsville, Maryland, and the progeny are being tested for resistance under field conditions in Louisiana.

ROLAND (G.). **Étude d'une mosaïque observée sur Apium graveolens.** [Study of a mosaic observed on *Apium graveolens*.]—*Parasitica*, 7, 2, pp. 63–68, 1 fig., 1951. [Flemish summary.]

Celery mosaic virus [*R.A.M.*, 18, p. 292] was observed on celery in Louvain during August, 1950. This is the first record of this virus in Belgium. It was transmitted from celery to celery by sap inoculation and by *Myzus persicae*. Only one aphid out of five transmitted it and this lost its infectivity after feeding for two minutes on one plant and then ten minutes on a second.

SWANK (G.). **A preliminary report of a new compound, trans 1, 4-dibromobutene-2, for the control of damp-off.**—*Plant Dis. Reptr*, 35, 11, pp. 492–493, 2 figs., 1951. [Multilithed.]

From tests made at the Central Florida Experiment Station, Sanford, limited to one area and soil type, one season's results show that *trans* 1, 4-dibromobutene-2, (OS-1199) [*R.A.M.*, 30, p. 479] at 2 and 4 gm. per sq. ft. and methyl bromide (MC-2) [see above, p. 248] at 1 lb. per 40 sq. ft. were significantly better than a number of other treatments for the control of damping-off of celery seedlings [cf. ibid., 30, p. 134] due to species of *Rhizoctonia* [ibid., 30, p. 89], *Pythium* [loc. cit.], and *Fusarium* [ibid., 28, p. 559].

NEERGAARD (P.) & NEWHALL (A. G.). **Notes on the physiology and pathogenicity of Centrospora acerina (Hartig) Newhall.**—*Phytopathology*, 41, 11, pp. 1021–1033, 1 fig., 3 graphs, 1951.

Some of the data here recorded for the first time on the physiology and parasitism of *Centrospora acerina* [*R.A.M.*, 29, p. 364; 30, p. 140], which has been reported from most European and North American countries, were obtained in 1946 by both authors in collaboration at Cornell University, New York, and the remainder are based on independent work by each in Denmark and in New York State, respectively. Losses caused by the fungus are briefly reviewed.

Conidial production was induced by the inversion of fragments of infected leaf tissue over water or sulphuric acid solutions in closed containers at humidities as low as 80 per cent. The conidia, however, did not remain viable on glass slides for more than a few minutes in the dry air of the laboratory. *C. acerina* from celery grew much more rapidly on potato dextrose agar than either *Phoma apiicola* or *Cercospora apii* from the same host, and the pH range for the development of the first-named was higher and narrower than for *C. apii*. Exposure to natural or electric light incited the formation of a spinel red pigment by *Centrospora acerina* on malt agar. Pigmentation varied with the host, the substance being of a red to Mars orange colour when the fungus was placed in test-tubes in which *Primula malacoides* or cabbage seedlings were growing, fainter with lettuce, and absent in the case of tomato. Crystal aggregates, 2 to 4 mm. long, were produced in the agar.

Inoculation experiments with *C. acerina* demonstrated its extremely polyphagous character, among its hosts (besides the above-mentioned) being onion, carnation, and *Godetia hybrida*. The fungus was successfully isolated directly from a muckland field for the first time when suspected soil was dusted over the surface of potato dextrose agar, which gave rise during the next week to the typical dark, broad, torose, deeply submerged mycelium.

NEWHOOK (F. J.). **Microbiological control of Botrytis cinerea Pers. I. The role of pH changes and bacterial antagonism. II. Antagonism by fungi and actinomycetes.**—*Ann. appl. Biol.*, 38, 1, pp. 169–202, 1 fig., 1 graph, 1951.

Studies at the Imperial College of Science and Technology, London, demonstrated the various degrees of antagonism of strains of *Bacillus*, *Pseudomonas*, and

Chromobacterium, isolated from dead leaves of lettuce seedlings overwintering in the open, to a strain of *Botrytis cinerea* from a diseased lettuce seedling [*R.A.M.*, 16, p. 150; 30, p. 334 and next abstract] on lettuce extract agar and on wounded attached and detached lettuce leaves at temperatures ranging from 4° to 25° C. under conditions of high moisture and humidity. *Bacillus* sp. and a strain of *Bacterium coli* included for comparison were antagonistic only at temperatures above 15° to 20°, while the other strains were effective also at 4°. Bacterial growth on agar and on dead lettuce tissue usually raised the pH, initially 6·1, to 7·8 to 8·4, at which growth of *B. cinerea* was almost negligible and the activity of any pectinase produced greatly reduced. A strongly acid reaction produced by the fungus on nutrient agar and on lettuce leaves failed to neutralize this alkalinity, which in simultaneous inoculations was established before the acid reaction. The antagonism of the bacteria, however, was largely due to the production of antibiotic substances quite independent of the alkaline effect, some colonies giving rise to wide and others narrow inhibition zones. The mixed bacterial flora of all dead lettuce leaves tested was potentially inhibitory to *B. cinerea* to a degree as high or higher than that shown by the majority of the test strains in pure culture, many of which caused lysis of young active mycelium and germ-tubes. Some spores of the test strain of the fungus gave rise to new strains more resistant to antagonism than the parent.

In further experiments *B. cinerea* was inhibited under similar conditions by pure cultures of many fungi (chiefly species of *Fusarium*, *Phoma*, *Cephalosporium*, *Cladosporium*, and non-sporing types) and actinomycetes isolated from dead lettuce tissue. The mixed flora of soil suspensions inoculated simultaneously with *B. cinerea* on to wounded detached lettuce leaves gave 100 per cent. control, as did several individual fungi; on wounded leaves of living plants prior inoculation with the suspension was necessary. Control was most marked at 15° to 25° and due to the production by most species of antibiotic substances independently of a high pH.

Saprophytic antagonism is responsible for some of the natural control of *B. cinerea* in the field, where both the establishment and growth of the fungus and the degree of antagonism are influenced by available moisture. Earthing-up induced early rotting of the petioles of ageing leaves, probably preventing the entry of *B. cinerea* into the stems. Three-weekly applications of a tetrachloronitrobenzene dust [ibid., 30, p. 385] were highly efficient in increasing final survival in the field, especially under cloches. It appears that in spite of antagonistic saprophytes *B. cinerea* can invade the soil by way of the roots of affected plants and can attack any contiguous root systems. It has also been recovered from the soil over six weeks after the disappearance of infected plants from above ground.

Control of *B. cinerea* on weeds was obtained by prior inoculation of killed tissue with soil suspensions.

Wood (R. K. S.). **The control of diseases of Lettuce by the use of antagonistic organisms. I. The control of Botrytis cinerea Pers. II. The control of Rhizoctonia solani Kühn.**—*Ann. appl. Biol.*, 38, 1, pp. 203–230, 1 diag., 1951.

In studies at the Imperial College of Science and Technology, London, *Bacillus subtilis*, *B. brevis*, *B. dendroides*, *B. anthracoides*, *B. megatherium*, *Pseudomonas fluorescens*, *P. aeruginosa*, *Streptomyces violaceus*, *S. albus*, *S. antibioticus*, *S. lavendulae*, two unidentified *S.* spp., Meredith's actinomycete, *Penicillium clavariiforme*, *P. patulum* [see above, p. 244], other unidentified *P.* spp., *Trichoderma viride* [see above, p. 238], and *Fusarium* spp. were antagonistic to *Botrytis cinerea* [see preceding abstract] in pure culture on lettuce extract agar. In all tests standard spore suspensions of a single isolate of *B. cinerea* from a diseased lettuce plant were used.

In the first experiment the amount of radial growth of *B. cinerea* from the centre of a plate towards one of the antagonists inoculated at the periphery was used as a measure of antagonism. Sporulation was rarely suppressed even when antagonism was most pronounced, and often increased along the edge of the colony as it approached the antagonist.

In the second series a 15 mm. square in the centre of the plate was inoculated with 0·025 ml. of suspension of the antagonist or with a 1 per cent. suspension of seed-bed soil. Either immediately or after incubation 0·025 ml. of *Botrytis* spore suspension containing approximately 2,500 spores was added to the centre of the square and spread to occupy an area approximately 10 mm. square. At 25° all the organisms completely controlled the growth of *B. cinerea* even when inoculated simultaneously. Similar control was obtained at 15° with few exceptions. At 5° only *Penicillium clavariiforme*, *Pseudomonas* spp. nos. 1 and 2, and *Fusarium* spp. 1 and 2 were active, still with simultaneous inoculation. Use of the soil suspension led to profuse development of bacteria and phycomycetes at all temperatures with complete suppression of *B. cinerea*.

In further experiments small leaf areas on Imperial or Trocadero lettuce were killed by placing a fragment of solid carbon dioxide in the centre of a ring of melted, sterile vaseline for 2 to 3 seconds. The wound was then inoculated with *Botrytis* spores either simultaneously with the antagonists or 2 to 4 days later. At 20°, following simultaneous inoculation, *Bacillus dendroides*, *Penicillium clavariiforme*, and *T. viride* gave almost complete, and soil suspension considerable, control. At 15° substantial control was given by all the treatments. Pre-inoculation increased control at both temperatures, though the effect was more marked at 20° when all the treatments eliminated rotting almost completely. At 5° all treatments had reduced rot eight days after inoculation; after further incubation only control by *P. clavariiforme* remained significant. In all cases sporulation by *B. cinerea* was completely inhibited. At 15°, omitting carbon dioxide killing, almost complete control was given by *Bacillus dendroides*, *Pseudomonas* no. 1, *Streptomyces* no. 1, *Penicillium clavariiforme*, *T. viride*, and *Fusarium* no. 1.

To investigate the growth of *Botrytis cinerea* through colonized tissue the areas enclosed by two concentric vaseline rings and killed were inoculated, the inner with *Botrytis* and the outer with *P. clavariiforme*, *Pseudomonas* no. 1, *Bacillus dendroides*, *Streptomyces* no. 1, or *T. viride*. After five days at 20° the control series showed typical wet rots extending 5 to 10 mm. beyond the edge of the outer ring. In the others the antagonists had developed freely in the intermediate zone; there was some *Botrytis* development in the centre but only slight discoloration beyond the area originally killed. Two days later control leaves were almost completely rotted while in the others *B. cinerea* was still limited to the central zone.

Under frame conditions seedlings from winter seed-beds, three weeks established, were wound-inoculated at the leaf apices in a vaseline ring and incubated in a moist chamber at 15° to 25°. After two weeks rot had spread in many cases to kill a large area of the leaf, while in others there was almost complete control. Young, potted plants, initially healthy but on which *Botrytis* infection developed naturally, were sprayed three times at 7-day intervals with a 1 per cent. glucose solution or with suspensions in this solution of *Penicillium clavariiforme* and *Pseudomonas* no. 1. Eight days after the beginning of the treatment the percentages of dead leaves were 10, 3, and 3, respectively, and after 25 days, 68, 13, and 24, respectively. In a similar experiment when all the plants were sprayed with a suspension of *Botrytis* spores, substantial control was given by *Pseudomonas* no. 1, *Penicillium clavariiforme*, and *Fusarium* no. 1.

From 1947 studies were made on the control of *Rhizoctonia* [*Corticium*] *solani* [ibid., 31, p. 5] using an isolate from a diseased lettuce seedling and the same antagonists as before. On soil extract agar few of the organisms inoculated at the

edge of the dish were antagonistic at 5°. There was a marked increase in their activity at 15°, but little further increase and less antagonism than to *Botrytis* at 25°. As before a few *Penicillium* spp. showed striking antagonism at all temperatures. In a series of dual cultures *Penicillium clavariiforme*, *Pseudomonas* spp. 1 and 2, and a soil suspension controlled the growth of *C. solani* at all temperatures. Similar control was given by the others at 25° when inoculated one day previously.

Under greenhouse conditions soil replicates inoculated with both pathogen and antagonist and incubated for two to three weeks before sowing with Imperial lettuce behaved very differently despite thorough mixing of soil and inocula. Using sterile sand and suspensions of antagonists the final percentage stand with *C. solani* (agar inoculum) alone was 28; in combination with *Streptomyces* no. 1, 93; with *S. lavendulae* 52; with *Penicillium clavariiforme* 81; and with *T. viride* 79. Under similar conditions but with sand–maize meal cultures of the pathogen the percentages were: *C. solani* alone 47; with *Bacillus subtilis* 85, *Streptomyces* no. 1, 70, *S. violaceus* 69, and *T. viride* 86. Using sterile soil–sand (3:1) the stands were: *C. solani* (agar inoculum) alone 6 per cent.; with *B. subtilis* 59, *B. dendroides* 87, *Streptomyces* no. 1, 90, *S. lavendulae* 81, *P. clavariiforme* 86, and *T. viride* 98. In sterile soil plus sand–maize meal cultures of both pathogen and antagonist the percentage stand in uninoculated media was 81; with *C. solani* alone 38; in combination with *S. lavendulae* 59; with *P. clavariiforme* 66; and *T. viride* or a mixture of all antagonists 62.

In a similar experiment with unsterilized soil the antagonists were added as two- to three-week-old cultures. Six days after sowing the stand was significantly increased by the majority of the organisms tested. Two weeks later, however, only isolated seedlings remained in each treatment with the exception of the uninoculated series. In attempts at control by the use of soil amendments the addition of dried grass alone reduced post-emergence damping-off and increased the final stand. Maize meal sprayed with a suspension of *P. clavariiforme* increased the stand, as to a lesser extent did *S. lavendulae*, but there was still some loss of seedlings in spite of the relatively profuse development of the antagonists. Disease control, much more uncertain than in sterile soil or sand, could be attributed sometimes to the activity of the antagonists and in others to the amendment alone, many organisms which were highly active in pure culture and under sterile conditions being completely ineffective in natural soil.

The addition of antagonists alone had no effect in the field and is unlikely, therefore, to be practicable in seed beds, while only slight increases in control could be expected in frames even under the most favourable conditions. A more promising line of attack would be the development of practices designed to sustain the activity of the soil microflora at a high level during the summer months.

Beecher (F. S.) & Doolittle (S. P.). **Dissemination of angular leaf spot of Cucumber.**—*Plant Dis. Reptr*, 34, 12, pp. 382–383, 1950. [Multilithed.]

Field experiments at Beltsville, Maryland, during 1949 and 1950 demonstrated the possibility of cucumber angular leaf spot (*Pseudomonas lacrymans*) [*R.A.M.*, 29, p. 271 and next abstracts] being disseminated by the striped and spotted cucumber bettles (*Acalymma vittata* and *Diabrotica undecimpunctata howardi*, respectively). Some washings from the latter insect, caught in flight in a field where the disease first occurred in these experiments, caused infection when sprayed on healthy plants, but no infection occurred when beetles of either species from diseased plants were caged on healthy ones.

Beecher (F. S.) & Doolittle (S. P.). **Control of angular leaf spot of Cucumber with a copper fungicide.**—*Plant Dis. Reptr*, 34, 12, p. 383, 1950. [Multilithed.]

At Beltsville, Maryland, various fungicides for the control of cucumber angular

leaf spot (*Pseudomonas lacrymans*) [*R.A.M.*, 27, p. 109 and preceding and next abstracts] were applied with a small power sprayer using a single hand nozzle, at 7-day intervals from 31st July to 28th August, 1950. The disease was present by 10th July and well distributed throughout the plots by 1st August. After the first application the disease continued to spread in the unsprayed plots and in those sprayed with ziram and zineb, but there was little further infection in those treated with tribasic copper sulphate. At the end of August the untreated plants showed severe and general injury of the young leaves by *P. lacrymans* and the new growth of plants sprayed with ziram and zineb was also badly damaged. Plants treated with tribasic copper sulphate developed hardly any spotting on leaves produced after 1st August and there was no apparent copper injury.

Wiles (A. B.) & Walker (J. C.). **The relation of Pseudomonas lachrymans to Cucumber fruits and seeds.**—*Phytopathology*, 41, 12, pp. 1059–1064, 3 figs., 1951.

A study at the University of Wisconsin, Madison, revealed progressive invasion of mature cucumber fruits (mostly of the Chicago Pickling and National Pickling varieties) by *Pseudomonas lacrymans* [see preceding abstracts] following penetration of the stomata. The bacteria spread between the cells and within the xylem elements of the mesocarp and so eventually reach the seed. They were not detected in the interior of the seed, but were readily demonstrated in the placental tissue and within the funiculus, and germinating seeds from diseased fruits frequently showed lesions on the surface of cotyledons emerging from the testa. Infection of the cotyledons, leaves, petioles, and stems appears to be restricted locally, no proof having been secured of vascular invasion of the vegetative tissues.

Faan (H. C.) & Johnson (J.). **The overwintering of the Cucumber mosaic virus.**—*Phytopathology*, 41, 11, pp. 1001–1010, 1951.

A survey for cucumber mosaic virus during the growing seasons of 1948 and 1949 in Wisconsin [*R.A.M.*, 30, p. 444] involved the collection and testing of 2,153 samples from 160 plant species, of which 360 (16·7 per cent.) were found to be infected, distributed among 15 annuals and 15 perennials or biennials. Of the 41 hosts previously reported as naturally infected, 17 were verified; the following 11 are here recorded for the first time as harbouring the virus: *Leonurus cardiaca*, *Euphorbia corollata*, *Valeriana officinalis*, *Gladiolus* sp., *Polemonium caeruleum*, *Phlox drummondii*, *Rudbeckia* sp., *Lychnis alba* [*Melandrium album*], *Mollugo verticillata*, *Salvia patens*, and *Cleome spinosa*. The presence or absence of the disease in most cucumber and tobacco crops was not associated with the occurrence of infected perennial weeds or other known perennial hosts in the vicinity [ibid., 27, p. 109]. Since nearly all infected overwintering hosts, including the wild perennials, are found in village home gardens, it is doubtful whether their eradication in or near commercial fields would effectively control the disease.

Zink (F. W.) & Davis (G. N.). **Cantaloupe mosaic as affected by nitrogen fertilization.**—*Plant Dis. Reptr*, 34, 12, pp. 371–373, 2 graphs, 1950. [Multilithed.]

The results of experiments carried out at the Imperial Valley Field Station, El Centro, California, during 1950 confirmed the findings of the previous season [*R.A.M.*, 29, p. 245] that the severity of mosaic virus in cantaloupes [ibid., 29, pp. 398, 454], based on the yield of marketable fruit, was not alleviated by a heavy split application of nitrogen during the growing season.

Castellani (E.). **Su un marciume radicale delle Zucche.** [Root rot of Vegetable Marrow.]—*Riv. Ortoflorofrutticolt. ital.* (formerly *Riv. R. Soc. Tosc. Ortic.*), 34, 7–8, pp. 134–136, 1 fig., 1950. [Received February, 1952.]

In early spring, 1948, vegetable marrows growing in hotbeds on the outskirts of

Florence appeared stunted and rosetted, and produced very little fruit. The main root was broken off a few cm. below the soil and numerous rootlets, rotted and frangible at the distal end, developed from the end. The secondary roots were similarly rotted and blackened. Small black spots 0·5 [by] 0·2 to 0·3 mm. developed sparsely and irregularly on the hypocotyl and on the roots. Pieces of affected tissue kept in a moist chamber became thickly covered with the mycelium of *Thielaviopsis basicola* [cf. *R.A.M.*, 2, p. 68]. A strain of the fungus isolated from endive [ibid., 28, p. 204] proved moderately pathogenic to vegetable marrow seedlings, when the roots were immersed in a suspension of a month-old culture of the fungus. The disease disappeared following the replacement of the soil and disinfection of the frames.

Smith (P. G.) & Minges (P. A.). **Resistance of strains of California Wonder Pepper to Phytophthora root rot.**—*Plant Dis. Reptr*, 35, 11, p. 509, 1951. [Multilithed.]

In the 1951 trial of mosaic-resistant strains of [chilli] pepper in the Merced area of California resistance to *Phytophthora capsici* [*R.A.M.*, 21, p. 118] was shown by all the 100 plants of Oakview Wonder variety, growing in alternate rows with varieties in which root rot infection was uniform, and by all the 96 plants of a mosaic-susceptible commercial strain California Wonder.

Goldin (M. I.) & Nazarovna (Mme M. Z). Реакция **Cyphomandra betacea** на вирус мозаики табака и стрика. [Reaction of *Cyphomandra betacea* to Tobacco mosaic and streak viruses.]—Микробиология [*Microbiology*], 20, 4, pp. 340–342, 1 fig., 1951.

In work on the resistance of *Cyphomandra betacea* to tobacco mosaic and tomato streak [a strain of tobacco mosaic] viruses [*R.A.M.*, 30, p. 590] at the Microbiological Institute of Sciences, Moscow, U.S.S.R., three leaves of young plants, grown from seed and free from tobacco mosaic virus, were infected by rubbing with sap from tomato plants infected with tobacco mosaic. A month later three out of six plants showed mosaic symptoms, with deformity of the leaves and the presence of inclusion bodies. The remaining three became diseased only after a second inoculation. However, 13 out of 24 control plants not rubbed developed conspicuous mosaic symptoms during the summer. Tomato scions, severely infected with mosaic and streak, were grafted on to 50 *C. betacea* plants, but seven of these remained quite healthy. It was found that while *C. betacea* could be infected, though less easily than tomato and tobacco, with various strains of tobacco mosaic virus both by grafting and sap rubbing, infection was not always possible, for some reason still unknown.

Drouillon (R.). **La maladie des taches brunes de l'Arachide.** [Brown spot disease of Groundnut.]—*Rev. Mycologie, Suppl. colon.*, 16, 1, pp. 1–11, 3 figs., 1951.

A brief comparative account is given of the history, geographical distribution, macro- and microscopic characters, biology, epidemiology, and control of *Cercospora personata* and *C. arachidicola* [cf. *R.A.M.*, 11, p. 279; 13, p. 74; 18, p. 571; 30, p. 196; 31, p. 101] the agents of brown leaf spot of groundnuts.

Peyer (E.). **Die Gelbsucht bei den Reben.** [Vine chlorosis.]—*Schweiz. Z. Obst- u. Weinb.*, 60, 23, pp. 454–456, 1951.

During the summer of 1951 there was a further outbreak of vine chlorosis in Switzerland, where the disorder aroused little attention during the predominantly dry decade from 1940 to 1950. In an account of lime-induced chlorosis [*R.A.M.*, 23, p. 374; 29, p. 287] in a publication of the Viticultural Research Institute, Klosterneuburg, Vienna, L. Moser recommends the yearly application of 1,000 kg. potassium salt per ha. to permeable soils containing 20 to 25 per cent. lime, the

corresponding quantities for 35 to 40 per cent. being 1,500 to 1,600 kg., and for 50 per cent. 2,000 kg. in the first year, 1,600 in the second, and 1,000 in the third, the final dosage being continued annually after the cure is effected. High lime content is usually accompanied by a shortage of magnesium [ibid., 28, p. 438] also, hence the advisability of using potash salt in the soil treatments. A combination of potash and basic slag may be applied, followed by borax at 20 kg. per ha. Moser's observation that the beneficial effects of iron sulphate [ibid., 30, p. 261] are purely temporary was corroborated by the results of the author's experiments in Switzerland, from which he concludes that the only remedy for chronic chlorosis is a thorough and permanent improvement of the soil by means of a rational fertilizing scheme, drainage, a judicious choice of stocks, or a combination of all three measures.

Oertli (H.). **Der Kampf gegen die Peronospora in der Rebschule.** [The control of *Peronospora* in the Vine nursery.]—*Schweiz. Z. Obst- u. Weinb.*, 60, 21, pp. 425–429, 5 figs., 1951.

The writer reports excellent control of vine *Peronospora* [*Plasmopara viticola*] in a Swiss nursery [*R.A.M.*, 30, p. 599] in 1950 and 1951 by means of M 555 [ibid., 31, p. 67], applied at weekly intervals at a dosage of 0·2 to 0·3 per cent. Used alone, it prevented the development of infection, while in combination with 0·25 per cent. Bordeaux mixture or 0·1 per cent. cupromaag it immediately eliminated all traces of the disease when already established.

Kramer (O.). **Die Bekämpfung des Oidiums.** [The control of *Oidium*.]—*Weinbau*, 6, p. 231, 1951. [Abs. in *Chem. Zbl.*, 123, 4, p. 589, 1952.]

Applied in good time and at sufficiently frequent intervals, the wettable sulphur losan at 0·1 to 0·2 per cent. has given absolutely reliable control of *Oidium* [*Uncinula necator*] on vines in Germany.

Demaree (J. B.) & Still (G. W.). **Control of Grape diseases and insects in eastern United States.**—*Fmrs' Bull. U.S. Dep. Agric.* 1893, 36 pp., 30 figs., 1951.

In this revised edition [cf. *R.A.M.*, 21, p. 318] the same diseases of American bunch grapes are redescribed with the addition of the symptoms and control of angular leaf spot (*Mycosphaerella angulata*), the most important foliage disease of muscadine grapes [ibid., 28, p. 381]. The general spray programme is revised as follows: application (1) ferbam (2 lb. to 100 gals.) or 6–6–100 Bordeaux mixture when the new shoots are 7 to 10 in. long; (2) 2 lb. ferbam or 4–4–100 Bordeaux plus 1½ to 2 lb. 50 per cent. wettable DDT powder three to five days before flowering; (3) as for (2) but with only 1½ lb. DDT, at petal fall; (4, first cover) 1½ lb. 50 per cent. wettable DDT powder plus 2 lb. ferbam ten days after (3); (5, second cover) as for (4) omitting ferbam, 35 to 45 days after flowering; and (6, third cover) as for (5) ten days later. Where black rot (*Guignardia bidwellii*) [ibid., 29, p. 499] is serious an extra spray with 8–8–100 Bordeaux or 2 lb. ferbam may be given when the shoots are only 1 to 2 in. long.

Ruizhkov (V. L.). Электронная микроскопия доклеточных форм жизни. [Electron microscopy of the precellular forms of life.]—Природа [*Nature*], (*1951*), 9, pp. 48–52, 4 figs., 1 diag., 1951.

Electron microscope examinations [*R.A.M.*, 30, p. 280], carried out in the U.S.S.R., of various plant viruses showed the particles of southern bean mosaic [ibid., 31, p. 218], tobacco necrosis [loc. cit.], tomato bushy stunt [ibid., 30, pp. 306, 557], and pumpkin mosaic [ibid., 31, p. 166] to be spherical and 25 to 30 mμ in diameter, and bean streak [ibid., 28, p. 44] and turnip mosaic [ibid., 30, p. 297]

viruses to be 17 to 19 mμ in diameter. Cauliflower mosaic [ibid., 31, p. 169], tobacco mosaic [ibid., 31, p. 212], cucumber mosaic [ibid., 31, p. 169], cabbage black ring [loc. cit.], pea streak [ibid., 26, p. 1], and orchid mosaic [ibid., 30, p. 610] viruses were all found to be rod-shaped, 15 mμ in diameter and 150 to 300 mμ long. These rods were often joined into long threads up to several thousand mμ in length. Some constituents of potato yellow dwarf virus [ibid., 30, p. 535] were also rod-shaped and measured 200 by 5 mμ.

Beran (F.). **50 Jahre Österreichischer Pflanzenschutz 1901–1951. Der Aufbau des Österreichischen Pflanzenschutzes 1945–1951. Tätigkeitsbericht der Bundesanstalt für Pflanzenschutz 1945–1950.** [Fifty years of Austrian plant protection 1901 to 1951. The organization of Austrian plant protection 1945 to 1951. Report of the work of the Federal Institute for Plant Protection 1945 to 1950.] —232 pp., 49 figs. (20 col.), 1 diag., 4 graphs, 1 map, Bundesanstalt für Pflanzenschutz, Wien, 1951.

The fiftieth anniversary of the foundation of the Plant Protection Station (now the Federal Institute for Plant Protection) in Vienna prompted the publication of this interesting compendium, comprising an historical retrospect [cf. *R.A.M.*, 29, pp. 163, 164], a list of publications 1927 to 1944, an account of the organization of Austrian plant protection from 1945 to 1951 (pp. 50–74), a report on the work of the Federal Institute for Plant Protection from 1945 to 1950 (pp. 84–158), and a list of publications 1945 to 1950.

Link (G. K. K.) & Goddard (D. R.). **Studies on the metabolism of plant neoplasms. I. Oxygen uptake of Tomato crown-gall tissue. II. The terminal oxidase patterns of crown-gall and auxin tumours of Tomato.**—*Bot. Gaz.*, 113, 2, pp. 185–195, 4 graphs, 1951.

The results of studies at the Departments of Botany, Universities of Chicago and Pennsylvania, have shown the rates of oxygen uptake of slices of hypocotyl of tomato plants, from the seedling stage until flowering, inoculated with crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*) [*R.A.M.*, 27, p. 276; 31, p. 230] to be at all times greater than those of comparable slices of uninoculated plants, the rates in both cases, particularly in the former, appearing to depend on the stage of development of the tissues at the time of slicing. Attention is drawn to the fact that in these studies it was not advisable to use non-affected parts of tumorous organs as controls.

Colasito (J.), Koffler (H.), Tetrault (P. A.), & Reitz (H. C.). **Antibiotic effects of circulin against certain Gram-negative pathogens.**—*Proc. Soc. exp. Biol., N.Y.*, 77, 1, pp. 107–108, 1951.

Circulin, a mixture of polypeptide antibiotics produced by *Bacillus circulans* Q–19, was shown by *in vitro* experiments at Purdue University, Lafayette, Indiana, to be highly toxic to *X*[*anthomonas*] *phaseoli*, *X. campestris*, *X. beticola*, *Erwinia amylovora*, and *E. carotovora*, which were inhibited at concentrations of 0·4, 0·8, 3·1, 3·1, and 3·1 μgm. per ml. of the culture medium, respectively. The corresponding dosages of streptomycin [cf. *R.A.M.*, 31, p. 220] necessary to produce comparable effects were 50, 50, 50, 0·2, and 50, respectively.

De Urries (M. J.) & Cañamas (R.). **Reacción de una colección de Trigos híbridos del Centro de Cerealicultura, a las razos números 14 y 21, de 'Puccinia graminis tritici'.** [Reaction of a collection of hybrid Wheats from the Centre of Cereal Culture to races Nos. 14 and 21 of *Puccinia graminis tritici*.]—*Bol. Inst. Invest. agron., Madr.*, 11, 24, pp. 29–47, 5 figs., 1951. [English and French summaries.]

Most of the hybrid wheat seedlings tested at the National Institute of Agronomic

Investigations, Madrid, for their reaction to races 14 and 21 of *Puccinia graminis tritici*, of which the former is the more prevalent in Spain [*R.A.M.*, 24, p. 387], were susceptible to both races; some were resistant to one but none to the two. Hybrid 205–58–43 and others derived from crosses involving Boomey, Marquillo, or L4 might prove useful in breeding for resistance to race 14, while 103–4–40 and other derivations of H–44 or Aragon 104–178 are of some interest as carriers of factors for resistance to 21. The behaviour of certain hybrids demonstrated the existence of two distinct biotypes of race 14, inducing reactions represented, respectively, by *x* (heterogeneous, with different types of pustules) and *l* (very resistant). Similarly, hybrid 200–52–43 showed resistance and moderate susceptibility, respectively, to two collections of race 21.

Vallega (J.), Cenóz (H. P.), Favret (E.), Sarasola (J. A.), Tessi (J. L.), Horovitz (N.), Cialzeta (C.), Frecha (J. H.), & Rodríguez Amieba (P.). **Epifitia de la roya del tallo en los cultivos de Trigo en 1950.** [An epiphytotic of stem rust in Wheat crops in 1950.]—*Hoja inform. Minist. Agric., B. Aires*, 13, 3 pp., 3 figs., 2 graphs, 3 maps, 1951. [English summary. Mimeographed.]

A major part of the three northern subregions of the Argentine cereal belt was seriously affected by wheat stem rust (*Puccinia graminis tritici*) in 1950 [*R.A.M.*, 30, p. 513], an estimated loss of 30 per cent. being sustained. The epiphytotic was favoured by environmental conditions and probably by the great susceptibility of the varieties grown, particularly Benvenuto Inca [loc. cit.]. It suffered roughly twice as much damage as Klein Cometa. Only races 17, 15B [see next abstract], 42, and 11 were involved, but 15B has recently increased in prevalence. A trial carried out at Castelar (province of Buenos Aires), in which the yields of certain varieties naturally attacked by *P. graminis* were compared with the same varieties treated with fungicides, indicated that no variety was resistant.

Koo (K. S.) & Ausemus (E. R.). **Inheritance of reaction to stem rust in crosses of Timstein with Thatcher, Newthatch and Mida.**—*Agron. J.*, 43, 4, pp. 194–201, 1951.

At the University of Minnesota the progeny of crosses of Timstein with Thatcher [*R.A.M.*, 28, p. 567], Newthatch, and Mida [ibid., 30, p. 221] wheats were tested in the field from 1945 to 1947 for their reaction to a collection of stem rust (*Puccinia graminis*) races. More intensive greenhouse tests were performed on seedlings to determine the inheritance of physiological resistance (throughout the life of the plant) to 21 races. All the hybrid progenies, like the parental varieties, were susceptible to race 15B [ibid., 31, p. 234 and preceding abstract].

The reaction to stem rust in the field was dependent on two complementary factor pairs in Timstein × Thatcher, and on one factor pair in Timstein × Newthatch and Timstein × Mida. Since Timstein was susceptible to the disease under field conditions, the resistance is assumed to have been contributed by the other three varieties. Field resistance could be combined with the physiological resistance of Timstein to 20 races.

Random F_3 lines of each cross were tested for seedling reaction to a single race to which Timstein was resistant and the other parent susceptible. Races 36, 11, and 17 were used for Timstein × Thatcher, Timstein × Newthatch, and Timstein × Mida, respectively. This type of inheritance was found to be controlled by a single factor pair, with resistance dominant and provided by Timstein. Selected F_3 lines of known reactions to a single race were increased and tested in the F_4 seedling stage with 21 races.

Thirty F_4 lines of Timstein × Thatcher that were resistant to race 36, 15 segregating, and 15 susceptible were selected on the basis of seedling reaction in the F_3. Timstein was found to carry a factor pair responsible for resistance to 20 races.

Thatcher carried a factor pair conferring high resistance to group 1 races (17, 19, 29, 69, 80, and 139); this reaction was epistatic and non-allelic to the Timstein resistance. Reactions to group 2 (races 16, 24, 24A, 52, 59, 59A, 90, and 116) were similar to those for race 36. Thatcher did not appear to carry a gene for resistance to these races.

From Timstein × Newthatch, 25 F_4 lines selected on the basis of seedling resistance to race 11 in the F_3 were tested with the same 21 races. Here again a factor pair from Timstein governed resistance to 20, while Newthatch carried a factor pair similar to that from Thatcher for high resistance to group 1 races. In the 25 F_4 lines from Timstein × Mida, selected on the basis of seedling resistance to race 17 in the F_3, a single factor pair from Timstein seemed likewise to control reaction to 20 races.

Batts (C. C. V.). **Physiologic specialization of Puccinia graminis Pers. in south-east Scotland.**—*Trans. Brit. mycol. Soc.*, 34, 4, pp. 533–538, 1951.

Inoculation experiments at the Edinburgh and East of Scotland Agricultural College during 1947–9 demonstrated the presence of the following varieties of *Puccinia graminis* in south-eastern Scotland [*R.A.M.*, 28, p. 165]: *tritici*, *secalis*, *avenae*, *agrostidis*, *poae*, and probably *phlei-pratensis* [ibid., 6, p. 83]. The wheat variety infected barley and rye only weakly and oat not at all; the rye variety infected *Agropyron repens*, *Bromus sterilis*, and barley but not oat, wheat, or rye grass; the oat variety infected *Alopecurus pratensis*, *Arrhenatherum avenaceum*, *Avena fatua*, *Dactylis glomerata*, *Trisetum flavescens*, and (by one inoculation only) *Poa pratensis*, but not rye grass, barley, wheat, or rye; var. *agrostidis* infected *Agrostis alba* and *A. vulgaris*, but none of the cereals; var. *poae* infected only *Poa* spp. and not cereals. The rust was found once on *Phleum pratense* and inoculation of young barberry leaves in the greenhouse gave positive results.

The uredospore measurements of the first five varieties [cf. ibid., 23, p. 337] were: 30·52 by 18·12, 26·23 by 17·01, 28·69 by 17·72, 24·76 by 14·18, and 20·85 by 14·17 μ, respectively; the corresponding teleutospore measurements being 48·79 by 17·84, 48·19 by 17·87, 47·27 by 17·62, 39·28 by 16·81, and 35·46 by 16·94 μ [cf. ibid., 4, p. 170].

Fifteen isolates of *P.g.* var. *avenae* from oats (14 collected in the Borders, one in Angus) and two from *D. glomerata* all gave a mean reaction of 2+, 1−, and 1+ on White Tartar (White Russian), Richland, and Sevnothree (a re-selection of Joanette Strain), respectively, characteristic of race 1 [ibid., 24, p. 362]. Uredospores on *Alopecurus pratensis* from two Border areas gave mean reactions of 2,1, and 3−, indicating race 2 [loc. cit.].

Rademacher (B.). **Untersuchungen über die fungistatische und fungizide Wirkung des Cyanamids am Beispiel des Weizensteinbrandes (Tilletia tritici (Bjerk.) Winter).** [Studies on the fungistatic and fungicidal action of cyanamide using Wheat bunt (*Tilletia tritici* (Bjerk.) Winter) as an example.]—*Phytopath. Z.*, 17, 4, pp. 353–374, 1951.

A detailed, tabulated survey is given of studies undertaken at the Institute of Plant Protection, Hohenheim, Stuttgart, with the objects of (1) explaining the toxic action of the cyanamide in nitro-chalk on the wheat bunt fungus (*Tilletia tritici*) [*T. caries*: *R.A.M.*, 12, p. 153] and (2) developing a method for the prevention of soil infection by dwarf bunt, which is becoming increasingly prevalent in south Germany.

In laboratory, pot, and field experiments nitro-chalk proved to be toxic to the spores, the active ingredient being the cyanamide which is formed immediately on contact with water. Its efficacy depends on the concentration and on the duration of the period of activity; for instance, a 0·01 per cent. solution acting for six days

suppressed sporidial formation completely and germination almost wholly, many spores being killed. Lower concentrations and shorter periods of activity delay the formation of sporidia and secondary conidia and germination by one to several days. This postponement alone may enable the seedlings to outgrow infection.

In practice nitro-chalk may be applied as follows. Dusting the seed with the compound at 50 to 200 gm. per doppelzentner [100 kg.] will largely, if not absolutely, prevent infection without impairing germination in heavy soil. A substantial reduction may be effected by soil amendments with nitro-chalk at 2 to 6 dz. per ha. shortly before and at the time of sowing. The same treatment also materially reduces or virtually precludes the contamination of healthy wheat seed in soil heavily infected by the spores of *T. caries*. Decisive for its success is the uniform distribution of the chemical and its penetration into the deepest layers of the soil.

Hanna (W. F.), Peterson (R. F.), & Anderson (J. A.). **How are new Wheat varieties tested?**—Reprinted from *Agric. Inst. Rev.*, 7 pp., 7 figs., 1951.

A description is given of current procedure employed at the Dominion Plant Pathological Laboratory, Winnipeg, for testing wheat varieties in Western Canada for disease resistance, in particular to stem and leaf rusts [*Puccinia graminis* and *P. triticina*: *R.A.M.*, 29, p. 495], bunt [*Tilletia caries* and *T. foetida*: ibid., 26, p. 540], loose smut [*Ustilago tritici*: ibid., 30, p. 461], and root rot [*Helminthosporium sativum* and *Fusarium* sp.: ibid., 30, p. 145; 31, p. 50], and testing field performance. Hybrid wheats are tested for resistance to rust in Mexico and South America under conditions favouring infection.

Glynne (Mary D.). **Effects of cultural treatments on Wheat and on the incidence of eyespot, lodging, take-all and weeds. Field experiments 1945–8.**—*Ann. appl. Biol.*, 38, 3, pp. 665–688, 1 pl., 9 graphs, 5 diags., 1951.

In a field experiment at Rothamsted Experimental Station, Harpenden, to determine the effects of various treatments on the fourth, fifth, and sixth consecutive crops of winter wheat, following one heavily infected and severely lodged by eyespot (*Cercosporella herpotrichoides*) [*R.A.M.*, 28, p. 619; 29, p. 247; 31, p. 170], weight of straw and percentage straws with severe eyespot lesions affected lodging independently, together accounting for 51 per cent. of the variance in percentage area lodged at harvest and 64 per cent. of that lodged 33 days before. By 1948 yields of grain on plots not sprayed with sulphuric acid were reduced to the level of those on similarly manured plots in the Broadbalk field, where wheat has been grown continuously for many years. Spraying increased grain yields by amounts similar to those resulting from one year's fallow on Broadbalk, but whereas fallow produced the greatest increment on plots with low nitrogen, spraying was most effective on those with high nitrogen.

Pichler (F.). **Ein für Österreich neuer Blattfleckenpilz auf Gerste.** [A leaf spot fungus new to Austria on Barley.]—*Pflanzenarzt, Wien*, 4, 6, pp. 3–4, 1 fig., 1951.

Two years ago the author's attention was drawn to the occurrence on Wong barley in Upper Austria of the foliicolous pathogen *Marssonina graminicola* [*Rhynchosporium secalis*: cf. *R.A.M.*, 28, p. 388]. This is the first record of the fungus in Austria since 1896, when it was reported from the Tyrol. Crop rotation with wheat and oats, which are immune from the leaf spot, offers the only prospect of control at present, but serious damage from this source is regarded as unlikely.

Jensen (N. F.). **Powdery mildew of Barley. Studies of yield losses and the inheritance of disease resistance.**—*Mem. Cornell agric. Exp. Sta.* 305, 39 pp., 4 figs., 1951.

This is an expanded account of studies conducted at Cornell University Agricultural Experiment Station on barley powdery mildew (*Erysiphe graminis*) [cf.

R.A.M., 30, pp. 507, 515; 31, p. 60], based on a thesis, an abstract of which has already been noticed [ibid., 26, p. 296]. The physiologic race generally prevalent near Ithaca, New York, was identified as race 4 or one closely resembling it in behaviour.

Virginia develops two new hybrids. *Seed World*, 70, 1, p. 22, 1952.

The maize hybrids VPI 645 and VPI 802, developed after six years' breeding at the Virginia Agricultural Experiment Station, will be available in a limited supply during 1952. VPI 802 is more resistant to stalk rot [*Diplodia* spp. and *Gibberella* spp.: *R.A.M.*, 30, pp. 153, 607; 31, p. 61] and leaf blight [*Helminthosporium turcicum*: ibid., 30, p. 409; 31, p. 13], stands better, and matures slightly earlier than U.S. 262 and U.S. 357. In 15 tests in Piedmont and eastern Virginia it has outyielded other test varieties. VPI 645 is slightly later than U.S. 13 in maturity and has outyielded it in 16 tests and U.S. 505 in 23 tests. It is quite resistant to stalk rot and to [unspecified] leaf blights common in Virginia, and is recommended for general planting west of the Blue Ridge for elevations of 2,500 ft. or under or in similar climatic conditions, and for northern Piedmont. It may also be planted in other areas where hybrids of U.S. 13 maturity are required.

Saccas (A. M.). **À propos de quelques champignons nouveaux parasites et saprophytes sur Maïs.** [On some new fungous parasites and saprophytes of Maize.]—*Rev. Path. vég.*, 30, 3, pp. 161–196, 19 figs., 1951.

Descriptions are given of 19 new species of fungi found on maize in French Equatorial Africa [see next abstract], with comparisons with previously described species. The following were found on living plants: *Coleroa maydicola* n.sp., apparently saprophytic on old leaves; *C. boukokoensis* n.sp., saprophytic on leaves severely infected by *Ascochyta maydis* [loc. cit.]; *Coniothyrium maydis* n.sp. on leaf sheaths round withered stems, probably saprophytic; *Didymosphaeria maydis* n.sp., perithecia 150 to 170 μ in diameter, asci 75 to 90 by 8 to 10 μ, ascospores 10 to 12·5 by 5 to 6·5 (mean, 11·2 by 5·7) μ, found only once, causing a few necrotic spots on the leaves; *Diplodia zeicola* n.sp., pycnidia 80 to 140 μ in diameter, pycnidiospores 10 to 14 by 4 to 5 (mean, 12·1 by 4·3) μ, causing a leaf spot; *Diplodina drouillonii* n.sp., pycnidia 50 to 80 by 100 to 120 μ, stylospores 6 to 7 by 1·7 to 2·5 (mean, 6·5 by 2·1) μ, infecting the stems, sometimes fatally; *Leptosphaeria zeicola* n.sp., perithecia 120 to 170 μ in diameter, asci 40 to 60 by 9·5 to 12 (mean, 50 by 10·5) μ, ascospores 14 to 18·5 by 3·5 to 5 (mean, 15·6 by 4·3) μ, causing necrotic leaf spots which may involve the death of a large part of the blade and reduce yield; *L. zeae-maydis* n.sp., perithecia 90 to 140 μ in diameter, asci 45 to 70 by 8 to 10 (mean, 57 by 9·1) μ, ascospores 18 to 23 by 3 to 4·5 (mean, 20·3 by 3·7) μ, causing leaf spotting; *Mycosphaerella zeina* n.sp., perithecia 80 to 100 μ in diameter, asci 34 to 40 by 9 to 12 μ, ascospores 10 to 12 by 4 to 5 μ, causing a leaf spot; *Ophiobolus zeae* n.sp., perithecia 400 to 550 by 350 to 500 μ, asci 136 to 170 by 9 to 10 μ, ascospores 125 to 160 by 2·1 to 2·7 μ, apparently a stem parasite; and *Phyllosticta zeae-maydis* n.sp., pycnidia 100 to 150 μ in diameter, stylospores 4·5 to 7 by 1·5 to 1·75 (mean, 6·1 by 1·6) μ, found on almost dead leaves with large necrotic spots.

Saccas (A. M.). **Principaux champignons parasites du Maïs (Zea mays L.) en Afrique Équatoriale Française.** [Principal fungous parasites of Maize (*Zea mays* L.) in French Equatorial Africa.]—*Agron. trop.*, 7, 1, pp. 5–42, 26 figs., 1952.

Descriptions are given of 26 species of fungi found on maize [cf. *R.A.M.*, 30, p. 607] in French Equatorial Africa [see preceding abstract], with notes on their geographical distribution, damage caused, and methods of control. Apart from those previously recorded in Central Africa the following are noteworthy. *Ascochyta*

maydis [loc. cit. and ibid., 10, p. 305] is widespread on maize leaves; *A. zeae* [loc. cit.] has been found on leaves on several occasions in native plantings, particularly in Ubangi-Chari, and in experimental plots at Loudima (Middle Congo). *Cercospora sorghi* [cf. ibid., 7, p. 712; 9, p. 63; 23, p. 410] is widely prevalent on the leaves; it was observed in 1949 in the Middle Congo, Ubangi, and in the forest area of Lobaye. *Colletotrichum zeae* [cf. ibid., 12, p. 505] was found on leaves on several occasions in native plantations in Ubangi-Chari and in experimental plots at the Boukoko Experimental Station, but only very rarely in association with *A. zeina* [loc. cit.]. *Colletotrichum falcatum* [*Physalospora tucumanensis*: C.M.I. map No. 186], not before recorded on maize, was observed on the leaves on several occasions. The leaf parasite *Coniothyrium zeae* [*R.A.M.*, 10, p. 305] was found in native plantings in marshy land near M'Bomou and in plantations in forest clearings near Lobaye. *Leptosphaeria maydis* [loc. cit.] is widespread locally on leaves. *L. variiseptata* [loc. cit.] was observed on leaves in several plantations in Ubangi-Chari, especially in wet, marshy places, where it was strongly parasitic. *L. zeae* [loc. cit.] was noted on leaves in native plantings in the forest area of Lobaye, and was found once in the Middle Congo, in experimental plantings at Inoni. *Mycosphaerella zeicola* [loc. cit.] occurred on leaves on several occasions in the Middle Congo and in Ubangi. *Phoma zeicola* [cf. ibid., 11, p. 225] was found on dead leaves in Lobaye and the Middle Congo. Pycnidia of *Physalospora zeae* [cf. ibid., 25, p. 392] were found on dead or largely withered leaves in the Niari Valley, M'Bomou, and Lobaye. *P. zeicola* [cf. loc. cit.] appears to be somewhat prevalent, having been observed on several occasions on almost dried-up maize stalks bearing blackened ears. *Pleosphaerulina zeicola* [ibid., 10, p. 305] was found on several occasions in Ubangi-Chari on living leaves in native plantations in the eastern savannahs and in plantations in the forest and pre-forest areas of Lobaye. *Septoria zeicola* [loc. cit.] appears to be prevalent locally wherever maize is grown.

Carlson (C. W.) & Olson (R. V.). **Iron-manganese ratios in nutrient solutions in relation to the chlorosis of Sorghum plants.**—*Proc. Soil Sci. Soc. Amer.*, 15, pp. 251–254, 1950 (published 1951). [Abs. in *Chem. Abstr.*, 46, pp. 1618–1619, 1952.]

Westland sorghum plants were used in this study at the Kansas Agricultural Experiment Station on the importance of the iron: manganese ratio in the nutrient medium as a factor in the development of chlorosis. Chlorophyll analyses and yields of total plant material showed the relationship to be significant only at the medium iron level (0·5 p.p.m.). The iron contents of the plant sap were independent of the ratio, whereas the manganese contents of the sap and dried tops rose with increased manganese concentration. The iron content of the dried tops at the medium iron level was higher in the two lower manganese treatments than in the higher one. At the high iron level the medium manganese treatment produced the maximum amount of iron in the dried tops. The iron to manganese ratios in the plant tissues agreed with those in the nutrient solutions.

Citrus field day at Mildura.—*J. Dep. Agric. Vict.*, 50, 1, pp. 9–14, 5 figs., 1952.

At the annual citrus field day held at Mildura, Victoria [cf. *R.A.M.*, 29, p. 258], in October, 1951, L. L. Stubbs stated that the slow decline or unsatisfactory growth of Ellendale Beauty mandarin on rough lemon rootstock in Victoria is due to a virus disease. Affected trees have sparse, chlorotic foliage with conspicuous yellow-banded veins on the older leaves; the twigs are bare, die-back is present, especially towards the top of the tree, and growth is stunted. The virus involved is distinct from the bud union decline (quick decline or tristeza) virus [loc. cit. and ibid., 31, p. 182]. Ellendale Beauty, though infected, makes vigorous growth on sweet orange rootstock. Further studies are in progress.

DuCharme (E. P.) & Suit (R. F.). **Xyloporosis of Citrus in Florida.**—*Plant Dis. Reptr*, 35, 12, pp. 556–557, 1951. [Multilithed.]

A disease, first observed in 1949, on Hamlin, Jaffa, Lue-Gim-Gong, and Valencia varieties of sweet orange, and Ruby Red grapefruit, all on sweet lemon rootstocks in Florida, was identified in 1951 as xyloporosis [*R.A.M.*, 31, p. 181]. The disease is probably not new to the State and is of no major importance in the Florida industry at present.

Fraselle (J. V.). **Fusarium oxysporum Schl. F. as the cause of vascular wilt disease of the Oil Palm (Elaeis guineensis).**—*Trans. Brit. mycol. Soc.*, 34, 4, pp. 492–496, 1951.

This is an expanded account of work in the Belgian Congo already noticed from another source [*R.A.M.*, 30, p. 317].

Moreau (C.) & Moreau (Mireille). **Pyrénomycètes du Caféier en Côte d'Ivoire.** [Pyrenomycetes of Coffee shrubs in the Ivory Coast.]—*Rev. Mycologie, Suppl. colon.*, 16, 1, pp. 12–80, 21 figs., 1951.

Full technical descriptions [without Latin diagnoses] are given of 15 pyrenomycetes found on coffee in the Ivory Coast, including 11 new species, one new variety, and one new form. Locally, the most strongly pathogenic fungi attacking coffee are *Macrophomina phaseoli* [cf. *R.A.M.*, 16, p. 454; 17, p. 345; 23, p. 431] and *Auerswaldia excoriata* n.sp. causing root rots, *Gibberella xylarioides* [ibid., 30, p. 228], *Peroneutypa multistromata* [ibid., 30, p. 227], and *Tryblidiella rufula* [ibid., 18, p. 552] causing tracheomycoses, *Nectria coffeigena* [cf. ibid., 14, p. 31; 25, p. 33] inducing canker, and *Hypomyces haematococcus* var. *breviconus* [ibid., 30, p. 228] (collar rot).

A. excoriata n.sp., on *Coffea liberica* at Akandjé, presents a superficial stroma, 0·5 to 2 by 0·3 to 0·6 cm., with short, spine-like protuberances and loculi with no differentiated wall, forming closely packed tubercles. The subglobular loculi, 150 to 230 μ in diameter, open at the apex and contain paraphysoids which regress as the asci enlarge; the asci develop sympodially and measure 90 to 160 by 4 to 6 μ (sporiferous part, 60 to 80 μ). The ascospores (normally eight in a row) are elongated-elliptical, rounded at the extremities, brownish-yellow to pale fuliginous, and measure 7 to 9 by 3 to 4 μ.

The other new species are *Myiocopron ramicolum* and *Massaria immersa* on branches of *C. liberica*, *Vizella bingervilliana*, *Entosordaria jacobifelicis* and *Balladyna parva* on leaves of *C. liberica*, *Ostropella verruculosa* and *Eutypa microspora* at the base of dead trunks of *C. canephora*, *Gnomoniella quadriguttulata* n.sp. on a branch of *C. liberica*, *Eutypella coffeicola* n.sp. on branches of *C. canephora* and *C. liberica*, and *E. perplexans* n.sp. on dead branches of *C. canephora*.

Bird (L. S.). **Ascochyta gossypii in Texas.**—*Plant Dis. Reptr*, 35, 12, p. 557, 1951. [Multilithed.]

Ascochyta gossypii [*R.A.M.*, 30, p. 229] was isolated from diseased cotton specimens from Navarro, Burleson, and Lubbock counties, Texas, in 1950 and was also found on cotton plants grown in greenhouses at College Station during 1950–1. The disease, confined largely to the blades of leaves, with occasional small lesions on the petioles and fruiting branches, caused considerable leaf shedding in bottom land plantings along the Brazos River in Burleson county.

Bird (L. S.). **The importance of resistance to the bacterial blight (angular leaf spot) disease of Cotton.**—*Plant Dis. Reptr*, 36, 1, pp. 3–4, 1952. [Multilithed.]

A test carried out at the Texas Agricultural Experiment Station in 1951 to evaluate losses in cotton yields caused by bacterial blight [blackarm] (*Xantho-*

monas malvacearum) [cf. *R.A.M.*, 23, p. 388; 29, p. 408; 30, p. 519] under conditions of artificial infection showed that a highly significant reduction in yield of seed cotton resulted. Non-inoculated plots developed no infection and on inoculated plots the disease was confined to the leaves. Three susceptible strains (Deltapine, Stoneville 2B, and Acala) had an average loss of 18·6 per cent., equivalent to an average financial loss of $5.05 per acre; Stoneville 20, highly resistant, sustained no loss.

Mains (E. B.). **Entomogenous species of Hirsutella, Tilachlidium and Synnematium.** —*Mycologia*, 43, 6, pp. 691–718, 20 figs., 1951.

This annotated list of entomogenous species of *Hirsutella*, *Tilachlidium* [cf. *R.A.M.*, 11, p. 179], and *Synnematium*, arranged under host groups, includes *H. stylophora* n.sp. (the conidial state of *Cordyceps stylophora*) [cf. ibid., 20, p. 575] on beetle larvae from Kent Lake, Michigan, and other parts of the United States, and *T. ramosum* n.comb., previously described under *Hirsutella* [ibid., 28, p. 523].

Duddington (C. L.). **Dactylella lobata, predacious on Nematodes.**—*Trans. Brit. mycol. Soc.*, 34, 4, pp. 489–491, 1 fig., 1951.

A description is given of *Dactylella lobata* n.sp. found in moss collected on Wimbledon Common, London. It captures nematodes by lobed adhesive branches [cf. *R.A.M.*, 30, p. 466, and next abstract].

Duddington (C. L.). **Two new predacious Hyphomycetes.**—*Trans. Brit. mycol. Soc.*, 34, 4, pp. 598–603, 5 figs., 1951.

Descriptions are given of two predacious hyphomycetes found in England [see preceding abstract], *Arthrobotrys robusta* n.sp. and *Trichothecium cystosporium* n.sp., both capturing nematode worms by means of adhesive networks.

Benjamin (R. K.) & Shanor (L.). **Sex of host specificity and position specificity of certain species of Laboulbenia on Bembidion picipes.**—*Amer. J. Bot.*, 39, 2, pp. 125–131, 19 figs., 1952.

In an examination at the Department of Botany, University of Illinois, in 1948 the following species of *Laboulbenia* [*R.A.M.*, 28, p. 524], *L. vulgaris*, *L. perpendicularis*, *L. truncata*, *L. tapirina*, *L. odobena*, and *L. bembidio-palpi*, were found on the carabid beetle (*Bembidion picipes*). Descriptions are given of the last three species, which are reported as new.

Bald (J. G.). **Stomatal droplets and the penetration of leaves by plant pathogens.**—*Amer. J. Bot.*, 39, 2, pp. 97–99, 1952.

In order to determine the influence of exuded stomatal water droplets and the retraction of surface moisture through stomata on the penetration of fungus pathogens in a semi-arid climate the ascospores of a species of *Pleospora* found on dead *Gladiolus* stems were discharged on to attached *Gladiolus* leaves enclosed in a moist chamber at the Department of Plant Pathology, University of California, Los Angeles. Germ-tubes penetrated mostly through the stomata, forming thick-walled, nodular vesicles of three, four, or more cells. Germ-tubes were relatively short on leaves that had little free water and, after the retraction of the droplets, grew towards the sunken stomata. When a film of free water covered both the stomata and the intervening leaf germ-tubes usually branched over the surface, producing abundant external mycelia. Hyphae often grew directly over the stomata without entering the pore, but when excess water had disappeared and the leaves were returned to conditions inducing stomatal droplets (cool, humid atmosphere and moist, warm soil) hyphal tips penetrated the stomata.

Germ-tubes of *Botrytis gladiolorum* [*R.A.M.*, 30, p. 230; 31, p. 186], both in the field and in controlled temperature cabinets, penetrated directly through the cuticle when leaves were continuously wet, and through stomata when they were alternately wet and dry, with stomatal droplets as the only surface water. It is suggested that stomatal droplets may provide a mechanism by which germ-tubes of *Puccinia antirrhini* [ibid., 30, p. 567] invade *Antirrhinum majus* leaves, since the disease is epidemic in southern California during the dry season, though the pathogen apparently requires free water for germination.

Bacteria may be drawn from the leaf surface into substomatal cavities and intercellular spaces with the retracted water.

Brierley (P.) & Smith (F. F.). **Survey of virus diseases of Chrysanthemums.**—*Plant Dis. Reptr*, 35, 12, pp. 524–526, 1951. [Multilithed.]

Much of the information in this survey has been noticed from other sources [*R.A.M.*, 29, p. 198; 30, p. 162]. Aster yellows virus [ibid., 5, p. 36; 28, p. 46; 31, p. 221] is reported on outdoor chrysanthemums in the vicinity of Beltsville, Maryland, and in Missouri, New York, Ohio, and Pennsylvania. Ivory Sea Gull mosaic virus, causing no symptoms in the Ivory Sea Gull source variety, produced yellow veinbanding, marked crinkling and dwarfing of leaves, and general dwarfing in Blazing Gold, Manaru, and Matador. It infected cineraria and *Matricaria* Golden Ball, though no symptoms appeared. Tomato aspermy virus [ibid., 30, p. 417], producing no symptoms in Delia, Mayford Pink, and Nightingale chrysanthemums, was recovered in tobacco. Systemic infection of this virus in zinnias [cf. ibid., 31, p. 239] induces mild yellow mottling, and does not protect against Price's tester strain of cucumber [mosaic] virus 1 [ibid., 31, p. 166].

Davis (S. H.) & Engel (R. E.). **A new material shows promise for brown patch control.**—*Golf Course Reptr* (formerly *Greenk. Reptr*), 19, 2, pp. 12–13, 1951.

A tabulated account is given of the results of experiments performed in New Jersey to determine the efficacy of orthocide 406 (California Spray Chemical Company) [*R.A.M.*, 31, pp. 67, 190] in the control of brown patch (*Rhizoctonia* [*Corticium*] *solani*) [ibid., 29, pp. 85, 86] on plots of Seaside creeping bent [*Agrostis palustris*]. Nine fortnightly applications at the rate of 100 gals. per 10,000 sq. ft. were made in each year with a power sprayer, using a fixed boom with flat fan nozzles, between 9th June and 21st September in 1949 and 29th June and 18th September in 1950. In the former year, when the incidence of infection was very low (2·5 per cent.) even on the untreated plots, orthocide 406 at 2 or 4 lb. per 100 gals. completely eliminated brown patch, and in 1950, at the lower dosage, it reduced the percentage from 43·1 to 3·3. Among the other fungicides tested, caloclor [ibid., 29, p. 30] also proved effective in both seasons, conferring absolute freedom from the disease in 1949 and permitting only 1·2 per cent. infection in 1950. P.M.A.S. [loc. cit.] exerted a strongly fungicidal action in 1949 (0·1 per cent. brown patch) but was less efficient in 1950 (9·3).

Warner (G. C.) & Hensel (R. L.). **Texas Rescue 46 is an improved Rescue Grass strain.**—*Seed World*, 69, 8, pp. 8–9, 2 figs., 1951.

Texas Rescue 46, a strain of rescue grass [*Bromus catharticus*] developed by the Texas Agricultural Experiment Station, is resistant to several of the more common diseases of winter-grown grasses such as leaf and stem rusts [*Puccinia triticina* and *P. graminis*], mildew [*Erysiphe graminis*], and smut [*Ustilago* spp.: *R.A.M.*, 21, p. 294] in all parts of the State where it has been tested. It also produces high forage yields and an abundance of seed.

Grau (F. V.). **Presenting : Merion (B-27) Bluegrass.**—*Seed World*, 69, 12, pp. 8, 33, 38–39, 6 figs., 1951.

Information is given by the United States Golf Association Green Section on Merion (B-27), the first improved Kentucky bluegrass [*Poa pratensis*] to be produced and sold on the open market, which originated as a single plant at the Merion Golf Club, Ardmore, Pennsylvania. After twelve years of testing and observation at the Arlington Turf Gardens and the Bureau of Plant Industry, tests conducted in 14 States and in Canada starting in 1947 disclosed that it is highly resistant to *Helminthosporium* leaf spot [*H. vagans*: *R.A.M.*, 26, p. 493] besides possessing other characteristics markedly superior to those of ordinary commercial bluegrass strains. Seed is being produced at Pennsylvania State College and is expected to be available shortly.

Gopalkrishnan (K. S.). **Development and parasitism of Physoderma graminis (Bus.) Fischer, on Agropyron repens (L.) Beauv.**—*Phytopathology*, 41, 12, pp. 1065–1076, 1 fig., 1951.

A species of *Physoderma* attacking *Agropyron repens* in Wisconsin, Illinois, and Indiana (the two latter being new records) is considered to be identical with *P. graminis* [*R.A.M.*, 28, p. 218]. Conspicuous symptoms of the disease include hypertrophy of leaves infected in the embryonic stage. The life-cycle of *P. graminis* closely resembles that of *P. zeae-maydis* [*P. maydis*: ibid., 30, p. 463], but distinctive features of the former are the symptomatology, systemic and vascular infection, and flower-inhibiting capacity. The resting sporangia remain viable over long periods and withstand dry heat up to 75° C. and freezing. Dormancy can be interrupted by low temperature and alternating high- and low-temperature treatment.

Infection occurs in the meristematic regions, rhizomes, and roots. Penetration of the cell walls of the host is accompanied by rhizomycelial swellings and partial dissolution of the walls.

It appears from the results of inoculation experiments on a number of grasses that this fungus is restricted to *A. repens*, which is not a host of *P. maydis*. Surveys for 1949 to 1950 in the Notre Dame area of Indiana revealed a peak period for the disease in mid- and late summer, with a slight rise in the autumn. A ratio termed the 'favourable index' is used to express the close correlation observed between prevailing temperatures and disease intensity and for the accurate prediction of incidence in the field. It is based on the following data. Temperatures between 23° and 31° permit of sporangial germination, 29° to 30° being optimum. At least a portion of days with a mean temperature of 68° F. was ideal for infection. The ratio of such favourable days to the number of days in the month is designated the 'favourable index'.

Goodey (T.). **Eelworm galls mistaken for ergot in flowers of Canadian grasses.**—*Nature, Lond.*, 169, 4298, pp. 456–457, 1952.

Structures on herbarium specimens of *Arctagrostis latifolia* and *Dupontia fisheri* collected in Canada in 1934 and 1936, and originally believed to be ergot (*Claviceps purpurea*) [*R.A.M.*, 28, p. 247], were found upon examination at the Nematology Department, Rothamsted Experimental Station, Harpenden, to be eelworm galls.

Lundblad (K.) & Lagerqvist (R.). **Stamförsök med Rödklöver.** [Strain experiments with Red Clover.]—*Medd. JordbrFörsök* 31, 67 pp., 1951. [English summary.]

This useful compilation, presenting a fully tabulated survey of the red clover-breeding experiments which have been in progress in Sweden since 1940, concludes with a chapter (V, pp. 52–56) by H. Ekstrand, dealing with the incidence of rot

(*Sclerotinia trifoliorum*) [*R.A.M.*, 31, pp. 125, 241] in some of the trials. Wherever the disease occurs it exerts a decisive influence on the density of the stand, which in turn is frequently correlated with the abundance or scarcity of the yield, though the connexion is not always apparent owing to differences in the rhythm of development among the various strains represented. The reaction of the strains to *S. trifoliorum* has been shown to vary in different localities for several reasons, among which are the existence of widely divergent biotypes of the fungus [ibid., 18, p. 684] and the influence of environmental conditions on performance. For instance, Sv. Merkur and Weibulls Resistenta, which are highly resistant in their places of origin, may sustain heavy damage when cultivated at a distance [ibid., 23, p. 24].

HACKER (W.). **Zur Bekämpfung des Kleekrebses.** [On the control of Clover rot.]—*Dtsch. Landw.*, N.F., 1, 2, p. 98, 1950.

The following are among the measures recommended for the control of clover rot [*Sclerotinia trifoliorum*] in the Dresden district of Germany [*R.A.M.*, 25, p. 455 and cf. preceding abstract]: substitution of the susceptible red clover with a mixture of alsike or white clover and grass; heavy grazing and trampling of dense, luxuriant clover stands by livestock into the late autumn; filling-in of gaps after deep harrowing in the spring with a clover-grass mixture or mustard; and top-dressings of a complete fertilizer to rehabilitate the impoverished fields. After a severe outbreak of the disease the only remedy is to plough up the stand and sow successive crops of mustard to be replaced immediately on harvesting with a fodder mixture.

LEACH (J. G.) & ELLIOTT (E. S.). **The blackpatch disease of Red Clover and other legumes in West Virginia.**—*Phytopathology*, 41, 12, pp. 1014–1049, 6 figs., 1951.

Black patch of clover and other legumes [*R.A.M.*, 30, p. 210], previously regarded as a relatively unimportant disease confined to the foliage, has been very destructive on red clover under humid conditions in certain areas of West Virginia, the causal organism behaving as a virulent parasite on the leaves, stems, flowers, and seeds, and reducing the seed yield by at least 50 per cent. in heavily infected fields. The fungus, apparently sterile, is seed-borne and causes a severe seedling blight. In the absence of fructifications it is dependent on aerial mycelium for spread from one plant to another in the field. Seed transmission, therefore, is of more than ordinary significance. The results of preliminary small-scale experiments indicate that the number of infection centres and the incidence of seedling blight may be appreciably reduced by seed treatment with arasan (1 part to 100 parts of seed weight).

The Fruit Yearbook, 1949 (Number Three).—176 pp., 2 pl. (1 col.), 47 figs., 1 map, London, The Royal Horticultural Society, 1949. 8*s.* 6*d.* [Received March, 1952.]

This publication includes articles on 'A minimum spray programme and suitable machinery for applying it' by H. B. S. MONTGOMERY (pp. 94–99), written to assist amateur fruit-growers; on 'Spraying equipment for the fruit garden' by H. G. H. KEARNS and N. G. MORGAN (pp. 100–108), written also for amateurs; and on 'Fruit spraying by contract for amateurs', by A. E. WOODGATE (pp. 109–110), briefly describing the spraying service operated for residents by the Eastbourne County Borough Council.

SPIT (J. M.) & DE JONGE (C.). **De bestrijding van schurft.** [The control of scab.]—*Meded. Direct. Tuinb.* (*Wageningen*), 14, 3, pp. 151–156, 1 graph, 1951. [English summary.]

A survey in 1950 of the incidence of apple scab (*Venturia inaequalis*) in 60 orchards in the Betuwe, Holland, revealed unsatisfactory control (over 15 per cent. infection) in 19, with more than 20 per cent. in 14. Among the causes assigned for the inadequacy of fungicidal treatment are unduly low pressure and insufficient

capacity of spraying equipment in proportion to the height of the trees and extent of the orchard; careless or too sparing applications, resulting in failure to reach every branch, leaf, and fruit, an essential condition of success; and miscalculation of spraying dates in relation to weather conditions [*R.A.M.*, 31, p. 126]. A concentration of 0·5 per cent. copper oxychloride suffices to reduce the incidence of the disease within tolerable limits.

Mulder (D.). **Stip in Appels als cultuurverschijnsel.** [Bitter pit in Apples as a cultural phenomenon.]—*Meded. Direct. Tuinb.* (*Wageningen*), 14, 1, pp. 26–27, 1 fig., 1 diag., 1951. [English summary.]

In this discussion of bitter pit of apples as a problem of Dutch fruit-growers [*R.A.M.*, 30, p. 234] the writer develops his thesis that the disorder is not attributable to any single nutritional or cultural factor but is induced by a variety of causes of different degrees of importance. It is a direct consequence of breeding and cultural methods, and its control requires the grower's constant attention, since every cultural measure influences bitter pit to some extent. Among the contributory causes are excess of nitrogen, relative shortage of phosphates due to magnesium deficiency, and adverse ratios of foliage to fruits. The relation of magnesium deficiency to bitter pit is considered to merit special investigation. To obviate one direct cause of the disturbance, i.e., the physiological results of variations in the water supply arising from picking during ripening, it may be well to postpone the date of picking and to put the fruit in cold storage immediately thereafter.

Sprague (R.) & Hord (H. H. V.). **The reappearance of silver leaf in the Apple orchards of Washington State.**—*Plant Dis. Reptr*, 36, 1, p. 30, 1952. [Multilithed.]

In 1951 further outbreaks of apple silver leaf (*Stereum purpureum*) [*R.A.M.*, 31, p. 244] were detected in the Wenatchee Valley, Washington, from Leavenworth to near Cashmere, less than 12 miles from Wenatchee. The disease was most prevalent in Okanagan county, near Malott and Tonasket. In replanting, a hardy understock such as Hibernal should be used, while double-worked frameworks of Hibernal, Charlamoff, or Antonovka may also promote resistance.

Grosjean (J.). **Onderzoekingen over de mogelijkheid van een bestrijding van de loodglansziekte volgens de boorgatmethode.** [Investigations on the possibility of silver leaf disease control by the bore-hole method.]—*Tijdschr. PlZiekt.*, 57, 4, pp. 103–108, 1951. [English summary.]

In experiments at the Phytopathological Research Institute, Wageningen, Holland, to determine the possibility of combating silver leaf of plum (*Stereum purpureum*) [*R.A.M.*, 28, p. 631] by the injection of chemicals into bore-holes, 2·5 cm. deep and 5 mm. wide, in the cortex, solid substances were in general more effective than liquids. Oxyquinoline sulphate (superol), for instance, applied to 44 orchard trees in the form of pastilles at a dosage of 10, weighing 0·5 gm. each, for a stem 15 cm. in diameter, produced complete recovery in four trees and an improvement in 12. A few cures were also effected by extracts of bark of poplar (*Populus candicans* and *P. trichocarpa*) [ibid., 30, p. 482], 0·2 per cent. solution of oxyquinoline sulphate, and 0·5 per cent. aaventa [see above, p. 261].

Fulton (R. H.). **Comparison of fungicides for control of powdery mildew of the Latham red Raspberry in 1950.**—*Plant Dis. Reptr*, 35, 12, pp. 538–539, 1951. [Multilithed.]

In field spray tests near Berrien Springs, Michigan, in August, 1950, for the evaluation of several new materials as eradicants of powdery mildew (*Sphaerotheca*

humuli) [see next abstract; *R.A.M.*, 14, p. 181; 30, p. 15] heavily infecting Latham red raspberries, sulphur applications, although giving control, were found to be too injurious for recommendation. Ferbam at 1½ lb. per 100 gals. and arathane 25 WP (1 lb.), thoroughly applied as a post-harvest spray, were non-injurious and both gave a control rating of 2, i.e., slight fungus growth on the lower side of leaflets and none on the tips, compared with 5, severe fungus growth on all surfaces of new growth and older leaflets, for the untreated.

Young (W. J.) & Fulton (R. H.). **A field test of several fungicides for the control of powdery mildew on Lucretia Dewberry in 1951.**—*Plant Dis. Reptr*, 35, 12, pp. 540–541, 1951. [Multilithed.]

In field tests of several fungicides against considerable attacks of powdery mildew (*Sphaerotheca humuli*) [see preceding abstract] on Lucretia dewberry [*Rubus flagellaris*: *R.A.M.*, 8, p. 113] in southern Michigan in 1951, actidione [ibid., 31, p. 248] at 2 p.p.m. plus triton B 1956 (2 oz. per 100 gals. spray) plus hydrochloric acid (15 ml.) gave the best control, followed by actidione plus hydrochloric acid, and nabam (2 qts.) plus zinc sulphate (1 lb.) plus triton B 1956, when applied before harvest. The mildew reappeared, however, after treatments were discontinued and it is suggested that earlier and continuous applications would give a more lasting control.

De Fluiter (H. J.) & Thung (T. H.). **Waarnemigen omtrent de dwergziekte bij Framboos en wilde Braam.** [Observations on the stunt disease of Raspberry and wild Blackberries.]—*Tijdschr. PlZiekt.*, 57, 4, pp. 108–114, 4 figs., 1951. [English summary.]

Attention is drawn to the occurrence of the *Rubus* stunt virus disease in raspberry plantations and among wild raspberries and blackberries [*R.A.M.*, 31, p. 192] in the Breda district of Holland. Wild blackberry species found infected by the virus in the province of Drenthe, remote from raspberry plantations, included *R. bellardii*, *R. flexuosus*, *R. ammobius*, *R. gratus*, *R. plicatus*, *R. affinis*, *R. caesius* (hybrid), *R. carpinifolius*, *R. pyramidalis*, and *R. sprengelii*.

The disease is transmissible by grafting [loc. cit.] (Harris, King, and Rietsma *in litt.*), and the author has initiated experiments to determine its communicability by aphids, of which *Macrosiphum funestum* and *Amphorophora rubi*, for instance, have been found feeding for lengthy periods on a number of *R.* spp.

Demaree (J. B.) & Marcus (C. P.). **Virus diseases of Strawberries in the United States, with special reference to distribution, indexing, and insect vectors in the east.**—*Plant Dis. Reptr*, 35, 12, pp. 527–537, 4 figs., 1951. [Multilithed.]

In this work, aimed primarily at locating virus-free strawberry plants of the more valuable varieties to replace the present infected stocks in the eastern United States, two distinct virus types, 1 and 2, which are in no way comparable to numbered designations of other investigators, were indexed on a clone of the East Malling strain of *Fragaria vesca* [*R.A.M.*, 30, pp. 478, 619]. Symptoms of type 1 were variable and included dwarfing, leaf distortion, crinkling, and chlorotic spotting. Those of type 2 were more uniform, plants being dwarfed, and the leaves yellowish-green, smooth, and symmetrical, with short petioles; petiole and leaf epinasty were common in the early stages of infection, followed by budding from the original stem.

Capitophorus minor and an unnamed aphid species, both very widespread in the eastern United States, are reported for the first time as vectors of strawberry viruses [ibid., 31, p. 131].

Virus-free plants of the varieties Klondike, Klonmore, Tennessee Beauty, and Tennessee Shipper suitable for the southern, and Armore, Blakemore, Catskill,

Corsican, Premier (Howard 17), Fairfax, Massey, Sparkle, Tennessean, and Vermilion for the northern strawberry-growing areas were selected for mass propagation.

ZENTMYER (G. A.). **Phytophthora cinnamomi on Avocado in Mexico and Costa Rica, and other Avocado diseases in Mexico.**—*Plant Dis. Reptr*, 36, 1, p. 31, 1952. [Multilithed.]

In April, 1951, *Phytophthora cinnamomi* [cf. *R.A.M.*, 31, p. 192] was isolated from avocado roots collected in Mexico, this being, apparently, the first record of the fungus from Mexico. In September, 1951, the fungus was isolated from avocado roots sent to California under quarantine permit from Costa Rica. A leaf spot of avocado seedling trees in Puebla, Mexico, was associated with a fungus apparently identical with *Mycosphaerella perseae*.

SCHUMACHER (G.). **Die Anforderungen, die an Pflanzenschutzgeräte gestellt werden müssen, und der derzeitige Stand derselben.** [The demands that must be made on plant protection apparatus and the present status of the same.] –*Z. PflKrankh.*, 58, 3–4, pp. 96–100, 1951.

In this paper, presented at the Plant Protection Conference held at Goslar, Germany, on 11th October, 1950, the author discusses some important problems relating to the construction, utilization, and economics of plant protection apparatus.

New disease controls. New methods and chemicals for canning crops reported at the American Phytopathological Society Meeting.—*Food Packer*, 32, 1, p. 31, 1951.

New methods of combating diseases in canners' acreages were described at the annual meeting of the American Phytopathological Society at Memphis, Tennessee, in December, 1950. It appears from research undertaken during the past season that tomatoes growing near potatoes are no more susceptible to blight [*Phytophthora infestans*: *R.A.M.*, 31, p. 226] than those at a distance. The development of chlorosis on portions of tomato leaves is the signal for a check as to the appearance of *Alternaria* [*solani*] lesions on the petiole or stem below the site of discoloration.

The response of Little Marvel, Wisconsin Perfection, Large White Marrowfat, and Alaska pea crops to tests with ceresan M [ibid., 29, p. 95; 30, pp. 258, 613; 31, p. 181] in Michigan varied with the mode of application to the seed. Dry treatments of 4 oz. per 100 lb. seed produced significant increases in stand, whereas reductions followed the use of a water slurry. Unless the seed was sown immediately afterwards, the latter treatment also caused injury to the plants, manifested by stunting, lack of secondary roots, and shortening and browning of the radicles. The water in the slurry probably allows the toxic principle to reach the embryo during the period between treatment and planting.

The Society has prepared a list of 72 recommended chemicals to control the 68 major diseases affecting vegetables and fruits. During 1949 over 200 preparations were checked by 196 plant pathologists. For instance, 10 chemicals are recommended for tomato blight control in the 25 States reporting the disease, while 16 have been accepted by the 24 States in which sour cherries are attacked by brown rot [*Sclerotinia laxa*] and leaf spot [*Coccomyces hiemalis*].

In preliminary tests the seed disinfectant vancide 51 [ibid., 31, pp. 181, 220] proved completely soluble in water and did not 'dust' from treated material. It has also been successfully used as a soil drench to control [unspecified] damping-off of spinach, and has further conferred effective protection on tomato seeds and leaves and cucumber seeds. Experimental chemotherapeutants 1182 and 1207 are efficient internal toxicants for certain systemic diseases, e.g., tomato vascular wilts

[*Fusarium bulbigenum* var. *lycopersici* and *Verticillium albo-atrum*] and peach X virus.

A pickling cucumber resistant to scab [*Cladosporium cucumerinum*: ibid., 24, p. 216; 30, p. 504] has been bred at the Wisconsin Agricultural Experiment Station, and seed should be available for distribution in 1952. The development of bacterial wilt of cucumber [*Pseudomonas lacrymans*: see above, p. 273] was found to be promoted by a low nitrogen and high potassium supply; the incidence of infection declined with increasing amounts of nitrogen. In connexion with the troublesome problem of the overwintering of cucumber mosaic virus [loc. cit.; cf. ibid., 27, p. 282; 29, p. 491], the virus has been detected in perennial ornamentals in village gardens in Wisconsin, for example, in *Phlox*, flowering spurge [*Euphorbia corollata*], and white cockle [*Silene cucubalus*].

The battle with pest and disease.—*Fruit-Grower*, 2934, pp. 528–530, 1952.

In this account of a conference of horticultural advisors and technicians, held at Wolverhampton, 13th March, 1952, under the auspices of Plant Protection Ltd., J. F. H. Cronshey reports that in field trials at Fernhurst 15 different crops, sown earlier than usual or under poor soil conditions for germination, were treated with thiram against damping-off [*R.A.M.*, 30, pp. 7, 134, 273]. Three crops only, runner bean [*Phaseolus coccineus*], cucumber, and vegetable marrow failed to give positive results, though, in the case of the last two, the treatment was successful at other times. Both emergence and the yield of all the other crops were increased, kale, swedes, and turnips proving particularly worth treating. Maize gave excellent results, and in large-scale tests on peas [see preceding abstract] yield was improved as much as the seedling stand. Occasionally 100 or 200 per cent. increase in emergence was obtained in these trials, usually in the very early sowings only, but the author believes it possible also for later crops.

In a trial for the control of apple scab [*Venturia inaequalis*: ibid., 31, p. 189] under perfect conditions for its development in 1951 in Worcestershire, R. W. Marsh records that the number of apples in the extra fancy and fancy grades of the variety Worcester Pearmain was 77·9 and 20·1 per cent., respectively, after three applications of ziram (at 3 lb. per 100 gals.), 66·7 and 29·9 per cent. after lime-sulphur (2 per cent. for the first application and 1 per cent. for the other two), 64·1 and 32·3 per cent. after mixed (50 per cent.) glyoxalidines [ibid., 31, p. 133] (1 qt.), 50 and 46·1 per cent. after thiram (3 lb.), 40·3 and 54·6 per cent. after organo-mercury sulphonate with 0·8 per cent. mercury (1 qt. and 1 pt.), and 46·6 and 46·6 per cent. after 34 per cent. heptadecyl glyoxalidine (3 pt.), compared with 5·7 and 49·7 per cent., and 0·5 and 50·4 per cent. for two unsprayed controls. After any of the spray treatments nine-tenths of the crop was readily saleable while half of the untreated crop would be wasted or unprofitable.

Scab control of a high order and a good control of mildew [*Podosphaera leucotricha*: ibid., 31, p. 243] were obtained with lime-sulphur at a cost for the fungicide of 4*s.* to 12*s.* per 100 gals. wash according to concentration, while organo-mercury (6*s.* to 10*s.*), thiram (15*s.*), ziram (21*s.*), and glyoxalidine (14*s.*) gave a fairly high control of scab but poor control of mildew. The results of this trial have shown the thiocarbamates to be too expensive for widespread use, mercurials being at present the only practicable substitute for lime-sulphur.

Byrde (R. J. W.) & Woodcock (D.). **Fungicides and phytotoxicity.**—*Nature, Lond.*, 169, 4299, pp. 503–504, 1952.

In studies at the Agricultural and Horticultural Research Station, Long Ashton, 2:3-dichloronaphthohydroquinone (compound II) displayed the same order of activity against conidia of *Sclerotinia laxa* as 2:3-dichloronaphthoquinone (I) [phygon: cf. *R.A.M.*, 23, p. 265], but was equally phytotoxic to tomato foliage and

plum fruitlets. In spore germination tests, when 1:4-diacetoxy–2:3-dichloronaphthalene (III) and I were used against *S. laxa*, *Botrytis fabae*, and *Cladosporium fulvum*, parallel dosage-response lines were obtained for each fungus, indicating a similar mode of action; the fungistatic activities were of the same order on a molar basis. In phytotoxicity trials I caused typical damage to Victoria and Early Laxton plums at 0·05 per cent. and to Market King tomatoes and broad beans at 0·1 per cent. No injury results from applications of III at equivalent concentrations. 2:3-dichloro–1:4-dimethoxynaphthalene (IV) was virtually inactive against all the test fungi.

Preliminary work indicated that the acetyl derivatives of pentachlorophenol and 3:5-DNC are also appreciably less phytotoxic than the parent phenols, while toxicity to *S. laxa* is similar.

It would seem that esterification may prove a useful method of minimizing the phytotoxicity of the reduced forms of quinonoid fungicides [ibid., 31, p. 223] and of other compounds depending on free hydroxyl groups for their fungicidal activity. Some evidence was obtained that the apparent toxicity of III may result from its conversion to II or I by an enzyme produced by the fungus.

British Commonwealth collections of micro-organisms. Directory of collections and list of species maintained in the United Kingdom and Crown Colonies.—iv+59 pp., London, H.M. Stationery Office, 1951. 5*s*.

The directory comprises the institutions maintaining individual collections of micro-organisms in the United Kingdom and Crown Colonies identified by code numbers, lists of the species maintained (arranged alphabetically under algae and protozoa, bacteria, fungi, viruses and bacteriophages, and yeasts), and a numerical list of collections.

British Commonwealth collections of micro-organisms. Directory of collections and list of species maintained in New Zealand.—iv+11 pp., London, H.M. Stationery Office, 1951. 1*s*. 6*d*.

This publication lists the institutions in New Zealand maintaining culture collections and the bacteria and fungi maintained by them, arranged alphabetically.

Bleasdale (J. K. A.). **Atmospheric pollution and plant growth.**—*Nature, Lond.*, 169, 4296, pp. 376–377, 1 fig., 1952.

During investigations in the Botany Department, University of Manchester, a strain of rye grass (*Lolium perenne*), Aberystwyth S 23, was grown in two greenhouses at Fallowfield, Manchester, one receiving the polluted air of that district and the other, similar air purified by passing through a filter and water scrubber. The latter, with one exception, gave considerably higher dry weights, though there was no sign of leaf damage in the greenhouse with polluted air, the daily mean concentrations of sulphur dioxide [*R.A.M.*, 28, p. 440] being 0·01 to 0·06 p.p.m., always well below the values reported to cause visible leaf damage. Similar results were obtained in standard soil plots receiving pure, suburban, and Manchester air (near the city centre).

Osaki (I.) & Karata (S.). **The influence of Barley sprouts on the production of riboflavin by Eremothecium ashbyii.**—*J. Ferm. Technol.* (*Japan*), 29, pp. 181–185, 1951. [Abs. in *Chem. Abstr.*, 46, 2, p. 577, 1952.]

Barley sprouts retard the growth of *Eremothecium* [or *Crebrothecium*] *ashbyi* [*R.A.M.*, 28, p. 548] in submerged culture and accelerate mycelial autolysis. The

addition of 1 to 2 per cent. barley sprouts to the basal medium, containing peptone as a source of nitrogen, results in an increase of about 200 per cent. in riboflavin production [ibid., 25, p. 354] as compared with the controls. The riboflavin-producing factor is distinct from that governing growth.

Wikén (T.), Keller (H. G.), Schelling (C. L.), & Stöckli (A.). **Über die Verwendung von Myzelsuspensionen als Impfmaterial in Wachstumsversuchen mit Pilzen.** [On the use of mycelial suspensions as inoculum in growth experiments with fungi.]—*Experientia*, 7, 6, pp. 237–239, 1951. [English summary.]

After a discussion of the difficulties attending the standard methods of preparing quantities of inoculum of fungi which produce no fructifications under laboratory conditions, the authors describe a new technique involving the use of mycelial suspensions for this purpose. They are prepared by shaking bits of mycelial mats with 6 mm. glass beads and distilled water or 'physiological' salt solution. The large particles are allowed to settle and the supernatant suspension is taken and diluted to the required volume. The suspended particles may be collected by centrifugal sedimentation and washed by resuspension in distilled water or salt solution. This procedure is now used regularly at the Institute of Agricultural Bacteriology, Zürich, in studies on mycorrhizal and litter-decomposing fungi, such as *Cenococcum graniforme* [*C. geophilum*] and *Mycelium radicis atrovirens* [*R.A.M.*, 25, p. 516 and next abstract].

Wikén (T.) & Somm (H.). **Wachstumsversuche mit Myzelsuspensionen von Mycelium radicis atrovirens in Ruhe- und Schüttekulturen.** [Growth experiments with mycelial suspensions of *Mycelium radicis atrovirens* in stationary and shake cultures.]—*Experientia*, 8, 3, pp. 110–111, 4 graphs, 1952.

Three strains of *Mycelium radicis atrovirens* [see preceding abstract] (one each from spruce and pine supplied by C. B. S., Baarn, Holland, and a pine culture from E. Melin, Uppsala, Sweden) were grown in submerged culture with continuous shaking, and showed a marked acceleration in growth as compared with the corresponding stationary ones. The maximum dry weight of mycelium was reached after 7 to 10 days' incubation in the former and 13 to 20 in the latter.

Tanrikut (S.) & Vaughan (E. K.). **Studies on the physiology of Sclerotinia sclerotiorum.**—*Phytopathology*, 41, 12, pp. 1099–1103, 1 fig., 1 graph, 1951.

That *Sclerotinia sclerotiorum* [*R.A.M.*, 31, p. 250] is not exacting in its nutrient requirements is indicated by its wide host range [ibid., 30, p. 207] and ability to subsist as a saprophyte for lengthy periods under certain conditions. This hypothesis was confirmed by studies at the Oregon Agricultural Experiment Station, in which the fungus proved capable of growing on almost all the substrata tested, with or without any specific mineral or organic nutrient. However, in the absence of nitrogen, phosphorus, or carbohydrates growth was scanty and sclerotia few or lacking.

Although all cultures grew best at 15° to 25° C., development and sclerotial production took place between 0° and 30° [ibid., 5, p. 269; 12, p. 671]. The fungus, therefore, can at least maintain itself at virtually any temperature suitable for crop plant growth. Moreover, it can grow quite well over the wide pH range of 2·4 to 9·6. This extreme adaptability, together with its habit of producing tough, resistant sclerotia, which survive unfavourable periods, greatly complicates the control of *S. sclerotiorum*. The most encouraging factor emerging from these observations is the sensitivity of the pathogen to certain chemicals, e.g., urea, which was toxic at concentrations above 0·5 gm. per l. and inhibited growth completely at 3·5 gm. [cf. ibid., 31, p. 242].

Darby (J. F.), Larson (R. H.), & Walker (J. C.). **Variation in virulence and properties of Potato virus Y strains.**—*Res. Bull. Wis. agric. Exp. Sta.* 177, 32 pp., 12 figs., 1951.

In studies at the University of Wisconsin on 18 isolates of potato virus Y [cf. *R.A.M.*, 30, p. 578] the optimum temperature for the expression of typical rugose mosaic symptoms in potato was found to be about 24° C., the most severe but atypical symptoms being produced at 28° on plants which were one week old at inoculation. USDA seedling 41956, which is immune from potato virus X, responded to isolates of virus Y with reactions varying from few to many local lesions and mild to severe secondary symptoms, one-half of the isolates eventually killing the plants.

Previously reported local lesion hosts [ibid., 28, p. 237] were found to be unsatisfactory for detecting differences between isolates of virus Y or for determining physical properties. *Lycium rhombifolium* and *Physalis turbinata*, though local lesion hosts for most of the isolates, were not of practical value for quantitative work. *Datura meteloides*, *D. aegyptica*, and *D. fastuosa* were immune from virus Y and *D. metel* susceptible to it.

Since virus X inhibited virus Y in the production of spot necrosis on tobacco when inoculated simultaneously, an improved technique was developed, consisting of the introduction of selected strains of virus X into tobacco 24 hours before inoculation with virus Y. The X^H strain was best for differentiating between Y isolates, the weaker ones of which protected against the more severe isolates in both tobacco and potato.

P. virginiana and *P. heterophylla* naturally infected with virus Y were found in the central Wisconsin potato growing areas.

Van den Ende (G.). **Een kleurmethode voor zoösporen en zygoten van Synchytrium endobioticum (Schilb.) Perc.** [A staining method for zoospores and zygotes of *Synchytrium endobioticum* (Schilb.) Perc.]—*Tijdschr. PlZiekt.*, 57, 4, pp. 130–132, 2 figs., 1951. [English summary.]

Zoospores and zygotes of *Synchytrium endobioticum* may be stained by the following method devised at the Willie Commelin Scholten Phytopathological Laboratory, Baarn, Holland. Using Lemmerzahl's procedure [*R.A.M.*, 10, p. 335], fragments of fresh potato wart tissue in a drop of water are placed on a slide at 10° to 13° C. The swarming zoospores are fixed with osmic acid (1 per cent.) fumes and stained in a mixture of crystal violet (0·005 per cent.) and acid fuchsin (0·002 per cent.) in water. The slide preparation is dried by 12 hours' exposure to the air, differentiated with a drop of clove oil in xylol (1 : 1), washed with xylol, and mounted in Canada balsam. The nuclei, flagella, and blepharoplast are well differentiated.

Sanford (G. B.). **Effect of various chemicals on the natural healing of freshly cut Potato sets.**—*Phytopathology*, 41, 12, pp. 1077–1082, 1951.

The effect of various chemicals on the natural healing of freshly cut Warba (Netted Gem) potato setts, held in moist soil at 61° F., was investigated at the Dominion Laboratory of Plant Pathology, Edmonton, Alberta, Canada [cf. *R.A.M.*, 2, p. 384]. Dusting with calcium hydrate and a one-minute dip in 1 per cent. agitated spergon both expedited suberization. Fermate and sulphur dusts caused slight delay in healing, mercuric chloride solution (1 in 1,000) retarded it during the first three days, and 1 per cent. ceresan was very deleterious. Cut setts infected with leaf roll virus healed as rapidly as healthy ones. Wound periderm formation in the Warba and Katahdin varieties was effected more rapidly at 78° than at 61°. The treatment of freshly cut potato setts with an effective fungicide exerting a favourable effect on healing could thus well replace the present practice of

disinfecting whole tubers. Spergon seems to meet these requirements in respect of *Fusarium caeruleum*.

MIZUKAMI (T.). **Comparison of the pathogenicity of Ceratostomella fimbriata and Endoconidiophora sp. causal fungus of Taro black-rot, on Sweet Potatoes and Taroes.**—*Sci. Bull. Fac. Agric. Kyushu Univ.*, 12, 1, pp. 5–9, 2 graphs, 1950. [Japanese, with English summary.]

In cross-inoculation experiments at the Faculty of Agriculture, Kyushu University, Japan, with *Ceratostomella* [*Ceratocystis*] *fimbriata* and *Endoconidiophora* [*C.*] sp. [cf. *R.A.M.*, 29, p. 596], the agents of black rot in sweet potato [ibid., 30, p. 244] and taro [*Colocasia antiquorum*], respectively, the former pathogen caused severe infection on sweet potato and mild on *C. antiquorum*, while the latter attacked *C. antiquorum* only. The treatment of sweet potatoes with ether vapour prior to inoculation did not modify their reaction to the two fungi, whereas *C. esculenta* similarly treated was more severely infected below 20° C., while at 25° and 30° symptom development was retarded; these differences corresponded to the extent of wound cork formation at the various temperatures. It is concluded from these results that the factor protecting *C. antiquorum* from infection by *Ceratocystis fimbriata* is wound cork formation, which is not involved, on the other hand, in the reaction of sweet potato to *C.* sp.

MIZUKAMI (T.). **On the Helminthosporium disease resistance of Rice seedlings treated with ether vapor. I.**—*Sci. Bull. Fac. Agric. Kyushu Univ.*, 12, 1, pp. 1–4, 1950. [Japanese, with English summary. Received March, 1952.]

The number of spots developing on rice seedlings treated with ether vapour and then inoculated with a spore suspension of *Ophiobolus miyabeanus* at the Faculty of Agriculture, Kyushu University, Japan [*R.A.M.*, 29, p. 475] exceeded that occurring on unanaesthetized seedlings. When the vapour was applied to naturally infected seedlings with one to three spots on the youngest leaf, the size of the lesions increased in comparison with those on the untreated. It is apparent from these observations that the resistance of rice seedlings to *O. miyabeanus* is reduced by fumigation with ether vapour.

CHATTOPADHYAY (S. B.). **Effect of spraying with different fungicides on the control of secondary airborne infection of Paddy plants by Helminthosporium oryzae Breda de Haan.**—*Sci. & Cult.*, 16, 5, pp. 533–534, 1951.

Three fortnightly power-spray treatments with perenox (4 lb. per 100 gals.) between the tillering and flowering stages of rice in experimental trials at the State Agricultural Farm, Chinsurah, India, for the control of secondary infection by air-borne conidia of *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: *R.A.M.*, 28, p. 641 *et passim*] were more effective than comparable applications of dithane Z-78 in the reduction of both leaf and grain infection on the susceptible Patnai, Tilakkatchery, and Asra varieties.

CARPENTER (J. B.). **Target leaf spot of the Hevea Rubbertree in relation to host development, infection, defoliation, and control.**—*Tech. Bull. U.S. Dep. Agric.* 1028, 34 pp., 1 fig., 15 graphs, 1951.

A full account is given of studies covering the period from May, 1946, to September, 1949, on the epidemiology and control of target leaf spot (*Pellicularia filamentosa*) [*Corticium solani*] of *Hevea* rubber in relation to host development in Peru [*R.A.M.*, 29, p. 382]. The rapid expansion of the leaves, together with their pendent habit and glossy surfaces, complicates fungicidal treatment of leaf diseases. Target spot weakens the plant principally, if not exclusively, by reduction of the

effective leaf area. Experimental defoliation of seedlings over a period of eight months showed that plants continued to make satisfactory though not optimal growth when deprived of 20 to 40 per cent. of their foliage, but the loss of 60 to 80 per cent. resulted in severe depression of growth, while complete defoliation caused death in several months. This tolerance of slight to moderate defoliation confines fungicidal control of target spot, in regions where it is the only important foliar disease, to the few months when it is particularly severe. Where South American leaf blight [*Dothidella ulei*] is serious [ibid., 23, p. 316], the schedule must be adapted to the more exacting requirements for the control of that disease. The same fungicides are applicable to both.

Freshly liberated basidiospores of *C. solani* may germinate within two hours in either light or darkness and infect susceptible young leaves within three hours under favourable conditions. Longer exposures—for periods up to 23 hours—substantially increased (to nearly 100 per cent. at the maximum) the number of lesions and leaflets attacked.

Target spot was effectively combated by weekly applications of sprays or dusts from October to February, 1946–7. Wettable spergon (2 lb. per 100 gals.) plus 65 gm. dresinate xxx and 2 lb. cassava flour was the most efficient of the liquid preparations, reducing defoliation from 45 to 1 per cent. and infection from 70 to 35 per cent. The best dust was a combination of Swan sulphur and fermate (85 and 15 per cent. by weight, respectively), but dusting is not generally recommended owing to the lack of suitable equipment for application.

A survey of large numbers of clones, selections, and seedling populations of *Hevea* indicated that genetic disease resistance is uncommon, though a measure of tolerance exists. For instance, two top-working clones (FB54 and FB3363) appear to be tolerant in field plantings. Genetic resistance might be sought in *H. benthamiana* and *H. parviflora*, which have yielded some markedly tolerant selections, and in the seemingly highly resistant or immune, non-commercial *H. rigidifolia*. By the third or fourth year after the cessation of continuous growth, when annual leaf fall and refoliation commences, the rubber tree tends to outgrow its early susceptibility to *C. solani*. The known geographical distribution of target spot has been extended to include Porto Velho, Brazil, and Leticia, Colombia.

Pink disease.—*Circ. Rubb. Res. Inst. Malaya* 33, 6 pp., 1 col. fig., 1951.

Notes are given on the symptoms, dissemination, development, and control of pink disease (*Corticium salmonicolor*) of rubber in Malaya [*R.A.M.*, 30, pp. 387, 541]. The early stages of the disease on young trees may be checked by spraying or painting the infected bark with 4–5–40 Bordeaux mixture or by painting it with fylomax 90 (I.C.I. Malaya, Ltd.) at 4 oz. to 9 gals. [water] or with a water-miscible tar-acid fungicide [ibid., 14, p. 791; 23, p. 290; 27, p. 336], such as 5 per cent. izal, 7·5 per cent. paragerm, 10 per cent. killgerm, black cyllin, ialine or ialine white disinfectant [ibid., 27, p. 336] or white septol, 15 per cent. brunolinum plantarium, or 25 per cent. agrisol. If, however, the leaves have begun to wither the diseased portion of the branch or stem should be first tarred or painted with a mixture of 40 lb. asphalt (e.g. mexphalte 20/30 of J. Warren & Co.), 4 gals. kerosene or diesoline, and 3 pints solignum (or similar preparation), after which it must be removed and burnt. These curative measures should be supplemented by spraying or brushing the stems and branches (particularly the forks) with Bordeaux mixture at intervals of about three weeks until control is secured. Tall undergrowth should be cut back.

If mature rubber is attacked but there appears to be some prospect of saving the branch, it should be painted with cargilineum mixture [ibid., 17, p. 138] or the asphalt-kerosene mixture; if the disease is far advanced and the branch must be removed an application of tar suffices.

White (W. L.) & Downing (Mary H.). **Coccospora agricola Goddard, its specific status, relationships, and cellulolytic activity.**—*Mycologia*, 43, 6, pp. 645–657, 7 figs., 1951.

Studies at Harvard University, Massachusetts, and at the Quartermaster General Laboratories, Philadelphia, Pennsylvania, showed that three cultures, QM *336* and *337*, both isolated from peat collected in Michigan, and QM *991* from Knoxville, Tennessee, where it appeared as a contaminant in a test tube inoculated with the spleen of a rat, were all *Coccospora agricola* [cf. *R.A.M.*, 10, p. 552]. This fungus, described by H. N. Goddard in 1913, has remained an unknown entity since, but is now considered re-established. A dried specimen on tentage from Hawaii also belonged to this species. It is soil-inhabiting and strongly cellulolytic, with globose, hyaline, very thick-walled spores, 13·9 to 15·1 μ in diameter (wall up to 3·5 μ thick). Its cultural characters, morphology, and soil habitat closely resemble those of the genus *Humicola* [cf. ibid., 27, p. 487; 28, pp. 584, 585; 29, p. 473]. The three isolates, together with 26 of *H. fusco-atra* [ibid., 28, p. 533], eight of *H. grisea* [loc. cit.], and six of *Monotospora lanuginosa*, were grown on 3×1 in. strips of 12 oz. grey cotton duck, a 1 ml. spore suspension being pipetted on to each strip, cellulolytic activity being estimated by reduction of tensile strength. All the isolates tested, except those of *M. lanuginosa*, actively degraded the material at 30° C. Further study of similar or related fungi is to be undertaken.

Winter (A. G.). **Untersuchungen über die Ökologie und den Massenwechsel bodenbewohnender mikroskopischer Pilze. II. Mitteilung. Der Einfluss organischer Nährstoffe auf die Entwicklung einiger Pilze (Cladosporium sp., Chaetomium sp., Fusarium sp., Verticillium glaucum, Penicillium sp., Rhizoctonia solani u.a.) in natürlichen und partiell sterilisierten Böden.** [Studies on the ecology and mass alternation of soil-inhabiting microscopic fungi. Note II. The influence of organic nutrients on the development of certain fungi (*Cladosporium* sp., *Chaetomium* sp., *Fusarium* sp., *Verticillium glaucum*, *Penicillium* sp., *Rhizoctonia solani*, etc.), in natural and partially sterilized soils.]—*Arch. Mikrobiol.*, 16, 2, pp. 136–162, 20 graphs, 1951.

The reliability of the author's method for the quantitative determination of fungal growth in soil [*R.A.M.*, 30, p. 223] was further tested at the Phytopathological Institute, Bonn, Germany, in studies on the influence of organic nutrients on the development of several fungi forming only sterile septate mycelia, and also of *Cladosporium* sp., *Chaetomium* sp., *Fusarium* sp., *Verticillium glaucum* [ibid., 20, p. 304], and *Penicillium* sp., all isolated from soil, and *Rhizoctonia* [*Corticium*] *solani*, the agent of potato black scurf and stem canker, included as a representative of the plant pathogens which appear to flourish saprophytically in the soil.

Only two of the saprophytes, namely, the sterile mycelia L14 and L6, consistently responded by slightly increased growth to the enrichment of both natural and partially sterilized soil with biomalt, peptone, or glucose. In general, therefore, soil saprophytes require no supplementary nutrients, which may, in fact, even exert an adverse influence by stimulating the already existing antibiotic organisms. *C. solani*, on the other hand, was virtually unable to develop as a saprophyte without a nutrient reserve. Supplied with the above-mentioned nutrients or straw dust (with or without calcium nitrate), it throve equally in compost, garden soil, or sand, either in the natural state or partially sterilized by two hours' steaming [cf. ibid., 28, p. 499].

Warcup (J. H.). **Soil-steaming : a selective method for the isolation of Ascomycetes from soil.**—*Trans. Brit. mycol. Soc.*, 34, 4, pp. 515–518, 1951.

When 125-gm. samples of Kettering loam in glass tumblers were steamed at 100° C. for four minutes, the surface soil to a depth of 1 cm. removed [? discarded],

and ten soil plates [*R.A.M.*, 29, p. 530] prepared from the soil in each tumbler, it was found that certain fungi, particularly ascomycetes, possess spores resistant to brief steaming. Many of these are slow-growing and were seldom recorded from untreated soil, being suppressed by more rapidly growing fungi, but were favoured when only small numbers of colonies were present.

When 60 soil samples from many parts of the British Isles were steamed for periods of three to five minutes the fungi most commonly isolated included ascosporic species of *Penicillium* and *Aspergillus* and related genera. *A. fischeri* [cf. ibid., 12, p. 529; 28, p. 644] was the commonest ascomycete; rare in woodland soils, it was frequently present in agricultural and grassland soils, both acid and alkaline. Of the ascosporic *Penicillium* spp. the commonest were *P. luteum* [cf. ibid., 13, p. 727; 17, pp. 264, 456; 22, p. 405], frequent in grassland and garden soils, and *P. baarnense*, chiefly in grassland.

WARCUP (J. H.). **Effect of partial sterilization by steam or formalin on the fungus flora of an old forest nursery soil.**—*Trans. Brit. mycol. Soc.*, 34, 4, pp. 519–532, 1 pl., 3 diags., 1951.

This full account of work on the effect of partial sterilization of soil [see preceding abstract] on the fungus flora has appeared in a condensed form elsewhere [*R.A.M.*, 30, p. 591].

THORNE (D. W.), WANN (F. B.), & ROBINSON (W.). **Hypotheses concerning lime-induced chlorosis.**—*Proc. Soil Sci. Soc. Amer.*, 15, pp. 254–258, 1950 (published 1951). [Abs. in *Chem. Abstr.*, 46, 4, p. 1619, 1952.]

Theories that have been advanced in explanation of lime-induced chlorosis [cf. *R.A.M.*, 28, p. 525] are discussed in connexion with work at the Utah Agricultural Experiment Station. High soil pH, high lime, high soil moisture, and low temperatures do not prevent the uptake of iron but apparently assist in its inactivation within the [unspecified] plant [cf. ibid., 30, p. 166]. High potassium in chlorotic foliage and unbalanced potassium to calcium ratios are the result rather than the cause of chlorosis. There is no evidence that the precipitation of iron in soils or plants by high phosphate is generally responsible for lime-induced chlorosis. Moreover, large amounts of available manganese are not a significant factor in most high lime soils or in plants suffering from lime-induced chlorosis. The oxidation of iron to the ferric state and its possible inactivation in protein combinations, followed by a disturbance in the protein-chlorophyll combination, seems to afford a plausible partial explanation of the relations involved in chlorosis [cf. above, p. 274].

Proceedings of the Seventh Congress of the International Society of Sugar Cane Technologists, Brisbane, 25th August–15th September, 1950.—xxxi+795 pp., 17 pl., 143 figs., 8 diags., 76 graphs, 3 maps, 1951.

This Conference Report includes the following papers of phytopathological interest, apart from those noticed elsewhere in this *Review* [see next abstracts]: Varietal deterioration in Queensland, by N. J. KING (pp. 56–62) [*R.A.M.*, 14, p. 532]; New horizons in sugar-cane breeding, by G. C. STEVENSON (pp. 73–82) [ibid., 30, pp. 123, 246]; Recent trends in the production of cane seedlings in Queensland by the Bureau of Sugar Experiment Stations, by J. H. BUZACOTT (pp. 90–97) [loc. cit]; an appraisal of some sugar-cane parent varieties and their progenies with particular reference to disease resistance, by E. V. ABBOTT and E. M. SUMMERS (pp. 97–109); Disease testing and initial selection procedure in sugar-cane seedling progenies at the U.S. Sugar Plant Field Station, Houma, Louisiana, by E. V. ABBOTT and E. M. SUMMERS (pp. 109–116) [ibid., 30, p. 489]; Feeding habits of *Perkinsiella saccharicida*, by E. G. BABER and P. E. ROBINSON (pp. 155–167) [ibid., 27, p. 97]; Ratoon stunting disease, by D. R. L. STEINDL (pp. 457–465) [ibid., 30, p. 582];

Studies on the infection of sugar-cane stalks by the red rot fungus, *Physalospora tucumanensis* in Louisiana, by R. J. Steib and S. J. P. Chilton (pp. 499–50) [ibid., 30, p. 554]; and the *Phytophthora* rot of sugar-cane seed pieces in Louisiana, by R. J. Steib and S. J. P. Chilton (pp. 524–528) [ibid., 30, p. 389]. Appendix 2 (pp. 764–773) contains tabulated notes on the sugar literature published from 1938 to 1950.

Martin (J. P.). **Sugar-Cane diseases and their world distribution.**—*Proc. Congr. int. Soc. Sug. Cane Tech., 1950*, pp. 435–452, 1951.

This paper comprises Part I, a check list of the sugar-cane diseases of the world, causal agents, and distribution, and II, the sugar-cane producing countries of the world and the diseases occurring in each.

Dutt (N. L.). **The present Cane varietal position in India.**—*Proc. Congr. int. Soc. Sug. Cane Tech., 1950*, pp. 294–303, 2 diags., 1951.

Of the new sugar-cane varieties produced in India, Co. 449 proved fairly resistant to red rot [*Physalospora tucumanensis*; *R.A.M.*, 31, p. 87] and smut [*Ustilago scitaminea*; ibid., 30, p. 601] at the Sugar-Cane Research Station, Gudiyattam, Madras State; Co.475 is fairly resistant to red rot but susceptible to smut in Bombay State; Co.617 [loc. cit.] is resistant to both diseases; and Co.S.245 is susceptible to red rot but resists wilt [*Cephalosporium sacchari*: ibid., 29, p. 250] in the western tracts of the United Provinces.

Van Dillewijn (C.). **Fusarium pokkahboeng.**—*Proc. Congr. int. Soc. Sug. Cane Tech., 1950*, pp. 473–499, 7 figs., 5 diags., 6 graphs, 1951.

The author summarizes the results of investigations carried out by himself and co-workers at the Experiment Station, Cheribon, Java, from 1934 to 1937 on the symptoms and economic importance of *Fusarium* top rot of sugar-cane (*Gibberella fujikuroi* var. *subglutinans*) [*R.A.M.*, 14, p. 58; 27, p. 256; C.M.I. map No. 191], the host-parasite relationship, the morphology of the fungus, effect of external factors on infection, pathological histology, and direct and indirect control methods. Experiments have shown that factors which promote a higher growth rate of the host and result in a longer region of susceptible top all facilitated infection by the fungus. Isolates of *Fusarium* spp. from banana, onion, and bamboo were unable to cause pokkah boeng in sugar-cane. Most of the isolates from cane were *G.f.* var. *subglutinans* but a few were *F.* [*G.*] *moniliforme*.

For conidial germination an air humidity of 92 per cent. was necessary, and for further growth of the germ mycelium 94 per cent. or more. Conidia and ascospores stored at constant air humidity over the range 35 to 65 per cent. were viable after five months while dried cultures were still alive after more than a year. In laboratory tests 1 per cent. Bordeaux mixture strongly inhibited conidial germination on cane leaves, the addition of sulphur increasing this effect. In field spraying experiments under conditions of natural infection weekly treatment with 1 per cent. Bordeaux mixture from mid August until the end of December gave good results on the susceptible P.O.J. 2878; the plots averaged only one-quarter of the severe third stage of the disease found in untreated plots. Copper-lime-talc dust applied weekly was as effective as the Bordeaux spray. P.O.J. 2967 and 3016 are highly resistant to the disease and have replaced susceptible P.O.J. 2878 [*R.A.M.*, 31, p. 143] to a large extent.

Mills (P. J.) & Chilton (S. J. P.). **The effect of certain fungicides as seed treatments for Sugar Cane in Louisiana.**—*Proc. Congr. int. Soc. Sug. Cane Tech., 1950*, pp. 197–202, 1951.

Plot tests were carried out in 1946, 1948, 1949, and 1950 at the Louisiana

Agricultural Experiment Station, Baton Rouge, to assess the efficiency of various fungicides in preventing [unspecified] seed piece decay [*R.A.M.*, 30, pp. 78, 543] in the cane varieties Co. 290, C.P. 29–320, C.P. 36–13, C.P. 34–120, and C.P. 36–105. The 1949 tests included only 1 per cent. tersan, 1 per cent. phygon, and 2 per cent. puratized N5E since they had given the most consistent results in the previous years. In the 19 tests performed during the whole period these fungicides gave average stand increases of 14, 24, and 30 per cent., respectively, over the untreated. In 15 of the tests puratized N5E gave yield increases in all and the other two materials in 14, the average increases being 21 (4·8 tons), 17 (3·7), and 17 (3·8) per cent., respectively.

In another series using four varieties, three-eye pieces from the top of the stalk and from the bottom, and whole stalks were dipped in 1 per cent. tersan before planting. The average increases in stand over the untreated controls for all tests were 20, 15, and 15, and of yield 10 (2·3 tons), 12 (2·9), and 14 (3·7) per cent., respectively. It is pointed out, however, that the fungicides at present available do not prevent rotting in poorly drained soils, particularly when winter temperatures are low.

Hughes (C. G.). **The control of Cane diseases in Queensland.**—*Proc. Congr. int. Soc. Sug. Cane Tech., 1950*, pp. 465–473, 1951.

This is a brief account of the methods of controlling diseases of sugar-cane in Queensland [*R.A.M.*, 28, p. 545], details being given of legislation [ibid., 27, p. 496], the use of resistant varieties, plant selection, roguing, harvest and ploughout orders, sett treatment, modified agricultural practices, and the operation of the Cane Pest and Disease Control Boards [ibid., 29, p. 331; 30, p. 581].

Ling (K. C.) & Ma (P. T.). **A preliminary study on the perfect stage of the causal organism of red rot of Sugar Cane.**—*Proc. Congr. int. Soc. Sug. Cane Tech., 1950*, pp. 503–513, 8 figs., 1951.

In studies at the Taiwan Sugar Experiment Station, Pingtung, Formosa, perithecia of *Physalospora tucumanensis* [*R.A.M.*, 23, p. 358, and next abstract] developed on sterilized sugar-cane leaves (in water) inoculated 20 days previously with conidia of the fungus. They were also present from November to May on dead and drying leaves of numerous varieties in different localities in the field [cf. ibid., 30, p. 544]. The cultured perithecia were larger (191·4 by 194·51 μ) than those in the field (139·14 by 101 μ) and the asci and ascospores slightly longer but narrower (81·72 by 15·07 compared with 60·93 by 15·71 μ, and 23·53 by 8·13 compared with 19·52 by 8·35 μ, respectively). In culture the ascospores were frequently fusoid and somewhat curved while in the field they were predominantly ovate and straight. The differences may be due either to environmental factors or to the presence of strains of the fungus. Perithecia were not produced on green leaves without water; they were much more abundant on boiled green leaves and on dry leaves with very little water; they were not formed on the spindle, rind, fresh part of the stem, or root. They can also develop on sterilized green and dry leaf blades of maize, bamboo, *Saccharum spontaneum*, *S. narenga*, and other grasses and on dry rice stalks. Preliminary longevity studies indicate that the perithecia can still produce ascospores after being kept in a dry bottle in the laboratory for three months. Sixty-four per cent. of the ascospores germinated in distilled water after incubation for 18 hours at 30° C. The percentage germination decreases rapidly after desiccation for three hours or more.

Wang (S.-C.). **Studies on Physalospora tucumanensis Speg.**—*Proc. Congr. int. Soc. Sug. Cane Tech., 1950*, pp. 513–518, 1 fig., 1951.

The measurements of the perithecia, asci, and ascospores of *Physalospora tucumanensis* from Tainan, Formosa [see preceding abstract] were smaller than those

given by Spegazzini for the type material from Argentina [*Rev. Fac. Agron. La Plata*, 2, pp. 227–258, 1896], and those of Louisiana material [see next abstract], measuring 80 to 199 by 83 to 201, 51 to 83 by 14 to 19, and 14 to 16 by 7 to 9 μ, respectively. Monoconidial and monoascospore cultures in 1949 and 1950 proved that the fungus is homothallic. Perithecia were produced more abundantly on leaf pieces of the sugar-cane varieties C.P. 33–310, Co. 290, F. 108, and P.O.J. 3016 than on H. 29–7155, while *Saccharum sinense*, *S. spontaneum*, and *Miscanthus* sp. were more or less intermediate. The average diameter of perithecia from F. 108 and P.O.J. 3016 was larger (178 and 173 μ) than from C.P. 33–310 (110), *S. spontaneum* (95), and *Miscanthus* (115). Those from Chunnee, *S. robustum*, Co. 290, *S. sinense*, and H. 29–7155 were intermediate.

Edgerton (C. W.). **Results of recent investigations in Louisiana on red rot.**—*Proc. Congr. int. Soc. Sug. Cane Tech., 1950*, pp. 518–523, 1951.

The author collates the results of recent investigations in Louisiana on the mode of entry of the red rot fungus (*Physalospora tucumanensis*) into the sugar-cane plant [see preceding and next abstracts], the method of spread in the tissues, and certain aspects of the life-history of the fungus and host-parasite relationships [*R.A.M.*, 23, p. 358; 24, p. 120; 28, p. 359].

Hsia (Y. J.), Chian (L. T.), & Wang (C. S.). **The variety N : Co. 310 in Formosa.**—*Taiwan Sug. J. Quart.*, 3, 3, pp. 69–70, 1951. [Abs. in *Sugar*, 47, 2, p. 68, 1952.]

The results of a survey in Formosa of the N : Co. 310 [*R.A.M.*, 31, p. 144] sugar-cane variety, introduced from South Africa in 1947, revealed 3·5 per cent. infection by mosaic [virus: loc. cit. and next abstract] and 0·01 per cent. by red rot [*Physalospora tucumanensis*: see preceding abstracts]. It was also resistant [percentage not stated] to pineapple disease [*Ceratostomella paradoxa*: ibid., 30, p. 344], and is regarded as more generally promising than any other variety now under cultivation on the island.

Lo (T. T.). **A report on Sugar-Cane diseases in Taiwan.**—*Proc. Congr. int. Soc. Sug. Cane Tech., 1950*, pp. 452–456, 1951.

Most of this annotated list of diseases affecting sugar-cane in Formosa has already been noticed [*R.A.M.*, 28, p. 142; 30, p. 344]. The new variety P.T. 43–52 [ibid., 30, p. 543], highly resistant to sugar-cane mosaic virus [see preceding abstract], is now ready to replace the susceptible varieties. Chlorotic streak [ibid., 31, p. 145] was first reported in Formosa at Pingtung in 1948, and also occurs at Taichung, Puli, and other regions of high humidity. All the commercial canes, the varieties such as Chunnee and Badila and their hybrids, sorghum hybrids, *Saccharum robustum* F_1, and *Miscanthus* F_1 are susceptible [but see ibid., 30, p. 544]. Control consists in the selection of healthy seed pieces and hot-water treatment for 20 minutes at 48° C.

Dennis (R. W. G.). **Some Agaricaceae of Trinidad and Venezuela. Leucosporae : Part I.**—*Trans. Brit. mycol. Soc.*, 34, 4, pp. 411–482, 5 col. pl., 61 figs., 2 maps, 1951.

Full descriptions based on living material are given of 107 species and varieties of *Marasmius*, *Crinipellis*, *Chaetocalathus*, *Collybia*, *Micromphale*, *Mycena*, *Dictyoploca*, *Tricholomopsis*, and *Tricholoma* collected in 1949 in Trinidad, Venezuela, and Jamaica, 29 species and six varieties being named as new. Mention may be made of *Marasmius graminum* var. *equicrinis* n.comb. for *M. equicrinis* [*R.A.M.*, 27, p. 261] on dead bamboo leaves on the ground and on litter, *Mycena* (*Marasmius*) *theobromicola* n.comb. on rotten cacao pods, and *Mycena micropapillata* n.sp. on rotting cacao and other leaves, all in Trinidad. The author adopts Singer's name *Crinipellis perniciosus* [ibid., 23, p. 411] for *Marasmius perniciosus*. This fungus

was identified on a herbarium specimen [? of cacao] from Cuba in the Berkeley collection. Keys are given to the species of each genus.

WILSON (IRENE M.). **Notes on some marine fungi.**—*Trans. Brit. mycol. Soc.*, 34, 4, pp. 540–543, 1951.

Short descriptions are given of the incidence of marine pyrenomycetes and fungi imperfecti on seaweeds, wood, and rope [*R.A.M.*, 23, p. 360] in the intertidal area and below low-water mark on the coast of Wales at Aberystwyth and other places on Cardigan Bay, at Dale, Pembrokeshire, and Newcastle, Co. Down, Northern Ireland. Present on rope at Aberystwyth were *Halophiobolus opacus* [cf. ibid., 28, p. 584] (very common), *Helicoma maritimum* (common), and *H. salinum*, stat. conid. of *Ceriosporopsis halima*. All are new records for Britain.

HUGHES (S. J.). **Stachylidium, Gonytrichum, Mesobotrys, Chaetopsis and Chaetopsella.**—*Trans. Brit. mycol. Soc.*, 34, 4, pp. 551–576, 4 figs., 1951.

In this study the genera *Stachylidium*, *Gonytrichum*, *Mesobotrys*, *Chaetopsis*, and *Chaetopsella* are reviewed, nomenclators of all species attributed to the names being given, with the original substratum and country of origin.

S. bicolor, selected as the lectotype species of the genus, is illustrated and described. *S. bassianum* is synonymous with *Beauveria bassiana* [*R.A.M.*, 29, p. 89; 30, p. 368, *et passim*]. *G. caesium* [ibid., 18, p. 656], the type species of the genus, has been shown by E. W. Mason to be based on the conidiophores of *Melanopsamella inaequalis*, which is fully described. The name *Mesobotrys* [cf. ibid., 19, p. 669] is based on *M. macroclada* and *M. fusca*, which are regarded as conspecific; both are congeneric with *G. caesium*; a new combination, *G. macrocladum*, is proposed and the conidiophores and conidia are described. *Chaetopsis wauchii*, the type species of *Chaetopsis*, produces slimy didymospores from polyphialides, and not amerospores. *Chaetopsella* is regarded as a synonym of *Chaetopsis*, being based on *C. grisea*, an earlier name for *C. wauchii*.

S. bicolor was intercepted in California in 1943 on *Cattleya* sp. from England.

HUGHES (S. J.). **Hymenopodium.**—*Trans. Brit. mycol. Soc.*, 34, 4, pp. 577–578, 1 fig., 1951.

Examination of the presumed type collection of *Hymenopodium sarcopodioides*, on which the generic name *Hymenopodium* (1837) is based, showed it to be the same as *Clasterosporium caricinum* [cf. *R.A.M.*, 13, p. 327; 29, p. 523], the type species of *Clasterosporium*.

DA CAMARA (E. DE S.). **Mycetes aliquot Lusitaniae. XI, XII.** [Some fungi of Portugal. XI, XII.]—*Agron. lusit.*, 13, 2, pp. 117–151; 3, pp. 185–212, 5 pl., 1951.

In these further contributions to the knowledge of Portuguese fungi [*R.A.M.*, 30, p. 432; cf. also ibid., 31, p. 146], besides a number of other records new to science or to the country, are *Didymosphaeria dimastospora* n.sp. associated with *D. rhododendri* on *Arbutus unedo*; *Leptosphaeria lavandulae* n.sp. on *Lavandula stoechas*; *Peltosphaeria canadensis* on pine (*Pinus halepensis*); *Fusicoccum persicae* [ibid., 13, p. 183] on apricot; *Phomopsis bougainvilleae* n.sp. on *Bougainvillea* sp.; *Phomopsis cydoniae* on loquat [cf. ibid., 7, p. 744; 14, p. 816]; and *Septoria cerasi* on sour cherry [ibid., 29, p. 404].

NORONHA (E. DE A.). **Subsídio para o estudo da flora micológica de Angola.** [Contribution to the study of the mycological flora of Angola.]—*Agron. angol.*, *1951*, 5, pp. 85–94, 1951. [French and English summaries.]

Some of the species comprised in this list of 26 fungi collected in Angola (Portuguese West Africa) in 1948–9 (material of which is maintained at the Plant

Breeding Station, Nova Lisboa), have already been recorded [*R.A.M.*, 29, p. 408]. Among the others may be mentioned *Puccinia asparagi* on asparagus [C.M.I. map No. 216], *P. graminis* vars. *avenae* and *tritici* on oats and wheat, respectively, *P. triticina* on wheat, *P. purpurea* on sorghum [ibid., No. 212], *Phragmidium disciflorum* [*P. mucronatum*] on rose, *Uromyces appendiculatus* on bean (*Phaseolus vulgaris*), *Ustilago avenae* on oats [ibid., No. 238], *U. cynodontis* on *Cynodon dactylon* [*R.A.M.*, 26, p. 131], and *Cerebella cynodontis* on *Cynodon* sp.

Crandall (B. S.), Abrego (L.), & Patiño (B.). **A check list of diseases of economic plants of El Salvador, Central America.**—*Plant Dis. Reptr*, 35, 12, pp. 545–554, 1951. [Multilithed.]

This list of the diseases of economic plants in El Salvador includes those previously published [*R.A.M.*, 24, p. 51] and, *inter alia*, *Phytophthora parasitica* on pineapple [ibid., 29, p. 160] and *Citrus* spp. [ibid., 30, p. 217], *Cercospora personata* on groundnut [C.M.I. map No. 152; *R.A.M.*, 29, p. 605], *P. cactorum* causing fruit rot of chilli (*Capsicum frutescens* var. *longum*) and boll rot of cotton [cf. ibid., 17, p. 455], *Nectria dodgei* causing die-back and cherry decay of coffee [ibid., 25, p. 33] and die-back of *Crotalaria vitellina* [cf. ibid., 9, p. 91], *Rhizoctonia microsclerotia* [ibid., 29, p. 600] and *Sclerotium rolfsii* [ibid., 10, p. 102; 30, p. 447] on cotton, *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: C.M.I. map No. 92; *R.A.M.*, 31, p. 55] and *Piricularia oryzae* [loc. cit.; C.M.I. map No. 51] on rice, and *Phytophthora citrophthora* [ibid., No. 35] in soil.

Koenig (H. J.). **Kennzeichen (Symptome) der Viruskrankheiten an Tabakpflanzen.** [Characteristics (symptoms) of the virus diseases on Tobacco plants.]—*Tabak-Forsch., 1951*, 6, pp. 1–4, 1951.

On the basis of 46 contributions to the relevant literature the symptoms associated with the several tobacco viruses are described under four headings, viz., (1) foliar discolorations, (2) foliar malformations, (3) leaf, stem, and root necroses, and (4) symptoms on the flowers, capsules, and seeds.

Takahashi (W. N.) & Ishii (M.). **An abnormal protein associated with Tobacco mosaic virus infection.**—*Nature, Lond.*, 169, 4297, pp. 419–420, 2 graphs, 1952.

At the Division of Plant Pathology, University of California, a protein component, X, was resolved and isolated by electrophoresis [*R.A.M.*, 31, p. 211] from extracts of Turkish tobacco and tomato leaves infected by tobacco mosaic virus about seven days after infection. The protein was not present in similar extracts from healthy leaves.

Price (W. C.) & Fenne (S. B.). **Tomato rosette, a severe disease caused by a strain of Tobacco mosaic virus.**—*Phytopathology*, 41, 12, pp. 1091–1098, 2 figs., 1951.

The most prominent symptom of rosette, a severe disease of tomatoes observed in Virginia in 1949 and 1950 and caused by a strain of the tobacco mosaic virus [see below, p. 318], is drastic malformation and stunting of the foliage. The leaves are variously curled, twisted, and narrowed, or fern-like. In extreme cases the leaflets are reduced to tendrils, an aggregation of which imparts a witches' broom aspect to the plant like that associated with 2,4-D injury. Sometimes only the tips of the leaves resemble tendrils, the basal portions being narrowed and misshapen. Branching, rolling, or cupping of the leaves results in a rosette-like appearance. The name of 'rosette' has been chosen for the disease, since the 'shoestring' syndrome, though more common, does not develop until the plants have reached considerable size. Mottling, similar to that induced by wild strains of tobacco mosaic virus, is green rather than yellow and is accompanied at its inception by slight curling and distortion. In fact, at this stage rosette is indistinguishable from

the disease caused by the mild strains of the virus. Plants inoculated in the greenhouse produced flowers but rarely set fruit.

The virus was readily transmitted by mechanical inoculation in dilutions up to 1 in 1,000 from tomato to the same host, tobacco, *Nicotiana sylvestris*, and *N. glutinosa*, causing symptoms of the tobacco mosaic virus type, but not to bean (*Phaseolus vulgaris*). It produced crystalline plates in the trichomes and epidermal cells of tobacco and tomato plants [ibid., 11, p. 335 *et passim*]. It was unable to infect *N. sylvestris* previously inoculated with tobacco mosaic virus and it reacted with antiserum of the latter with comparable dilution end points. It differs from the parent virus in its symptoms on tobacco, tomato, and *N. glutinosa* and its inability to infect bean, and from the tomato enation mosaic strain of tobacco mosaic virus in the absence of enations [*R.A.M.*, 17, p. 77]. The name assigned to the tomato rosette virus is *Marmor tabaci* var. *rosettae* n.var.

Dreyer (A. F.) & Samson (R. W.). **Survey shows Tomato packers find spraying profitable.**—*Food Packer*, 32, 5, p. 55, 1951.

A questionnaire circulated in 1950 among the membership of the Indiana Canners' Association, with the co-operation of the Purdue University Agricultural Experiment Station, elicited the following information with regard to fungicidal treatment of the tomato crop. Spraying or dusting was noted as profitable by 16 canners, while five found that these practices did not pay. Eight estimated yield and quality increases ranging from 20 to 60 and 10 to 50 per cent., respectively. Eleven recorded control of late blight [*Phytophthora infestans*: *R.A.M.*, 31, p. 226], while five gave unsatisfactory reports. Eight stated that none of their growers would give up tomato cultivation rather than spray or dust, while 12 estimated that an average of 35 per cent. would do so. Nineteen reported that an average of 67 per cent. of their growers would continue tomato cultivation even if treatment were necessary, while 15 reckoned that 28 per cent. would be willing to risk the hazards of weather and disease and omit spraying or dusting.

The average estimates from 19 correspondents of the relative importance of five diseases, using a scale ranging from 1 for the most important to 5 for the least, were: late blight 1·73, early blight [*Alternaria solani*] 2·16, *Septoria* leaf spot [*S. lycopersici*] 2·45, anthracnose [*Colletotrichum phomoides*] 3·86, and grey leaf spot [*Stemphylium solani*: ibid., 27, p. 341] 4. Thirteen growers used fixed copper sprays, 10 dithane and parzate, 10 zerlate, Z–C, and corozate, four Bordeaux mixture, 12 an alternating schedule, seven fixed copper dusts, and one alternating dusts. Thirteen replies estimated spraying cost at an average of $3.92 per acre, while the corresponding figure for dusting was reckoned by 14 to be $4.89.

Smith (C. B.). **The nutrient-element balance of the Tomato and its susceptibility to Phytophthora infestans as affected by two levels of zinc.**—*Plant Physiol.*, 26, 4, pp. 737–749, 2 graphs, 1951.

At the Pennsylvania Agricultural Experiment Station the susceptibility to blight (*Phytophthora infestans*) of Rutgers tomato plants, grown in a greenhouse in strictly controlled nutrient solutions at two levels of zinc, 0·025 and 2·25 p.p.m., was determined by inoculating them at the fruit-setting stage with a culture of the tomato race of the pathogen [*R.A.M.*, 26, p. 570] and calculating disease indices. The variation in the zinc levels produced no statistically significant effects on susceptibility to blight, but the trend was definitely towards greater resistance at the higher concentration. The zinc concentrations in the leaflets of the high-level treatment were consistently about treble those of the low one, but the plants appeared normal. The results are interesting in view of the fact that Emge and Linn have shown that zinc is absorbed by the [tomato] plant when zineb decomposes on it (abs. in *Phytopathology*, 40, p. 8, 1950).

Golden Sphere Tomato.—*Seed World*, 68, 9, p. 10, 1 fig., 1951.

A new yellow tomato variety, Golden Sphere, developed from a cross between Pan America and Tucker's yellow selection is highly resistant to *Fusarium* wilt [*F. bulbigenum* var. *lycopersici*: *R.A.M.*, 31, p. 213], and has been released to seedsmen by the Tomato Disease Investigations Laboratory, Jacksonville, Texas.

Gregory (P. H.) & Waller (S.). **Cryptostroma corticale and sooty bark disease of Sycamore (Acer pseudoplatanus).**—*Trans. Brit. mycol. Soc.*, 34, 4, pp. 579–597, 3 pl. (1 col.), 3 figs., 1 diag., 1 graph, 1 map, 1951.

A full account is given of origin, spread, and symptoms of the disease affecting sycamore trees in south-east England [*R.A.M.*, 30, p. 552] and of the causal fungus, which is identified as *Cryptostroma corticale* (Ell. & Everh.) n.comb.

Although all affected trees in Wanstead Park were felled in the spring of 1949, about 60 new infections were found in 1950. Affected leaves become dry, turn greenish-brown on the upper surface, and curl inwards. They bend above the base of the petiole and droop, but do not abscis. As a rule only part of a tree wilts. Dead branches with sporing lesions occur at all seasons and at any height, and die-back of small branches in the upper part is prevalent on trees which in other respects appear to be normal. A greenish-brown to yellow stain in the heart wood generally occupies only part of the cross section and may contract to a dark thread as it approaches the roots, or it may expand towards the sapwood and bark in one or more places. A sporing lesion is generally present where the stain meets the bark.

Following wilt and die-back the next symptom is partial or complete failure to leaf in spring. At this stage the bark is raised in blisters, usually elongated vertically and having a wavy edge. If the bark is uniformly raised all round the trunk blistering is not readily apparent, but it can be felt if the bark is lightly touched with the finger tips. Beneath the edge of the blister the extending lesion consists of a split sheet of white mycelium adhering partly to the inner and partly to the outer bark and merging into unsplit mycelium where the outer bark remains firmly attached to the inner. The older part of the sheet is bluish-green and is later covered with spores. If the spore mass is blown or brushed away from the older stroma the conidiophores are exposed as a greenish-grey layer, and if this is scraped away the black, sclerotic floor stroma is exposed. On the younger parts small, irregular patches of stroma form a mosaic pattern of white, blue, olive green, and black.

After the blister stage the affected bark slowly peels off. The exposed dense, black spore layer is not easily wetted by rain, and suggests the name 'sooty bark' for the disease. The spore layer is produced in any part of the bark outside the cambium. In thin-barked trees it is generally just under the cork layer and tends to spread all round. Trees with rough, thick bark may develop only scattered, larger or smaller spore layers. Such trees usually lose their bark gradually over several seasons. Specimens were matched against type material of *Coniosporium corticale* [ibid., 12, p. 174]. As the type species of *Coniosporium* has multiseptate conidia and differs considerably from the sycamore fungus it was deemed necessary to erect a new genus. *Cryptostroma* n.gen. is characterized by immersed stromata consisting of a floor and a roof connected by stromatic columns, the short conidiophores, ending in phialides, forming a continuous layer covering the floor; the conidia are brown, endogenous, dry, and in chains. In *C. corticale* the rounded, black, persistent, stromatic columns measure up to 1 by 0·3 mm. The roof stroma is black, typically with inflated sclerotic cells. The conidiophores measure 20 to 30 by 3 to 6 μ and are straight, unbranched, hyaline, and become sclerotic at the base; the terminal cell is a flask-shaped phialide. The ovoid conidia (rectangular from mutual pressure) measure 4 to 6 by 3·5 to 4 μ (not 3 by 2 μ, as previously stated) [ibid., 28, p. 602]. A capillitium of unbranched threads, 1·5 μ in diameter, is attached to the floor stroma.